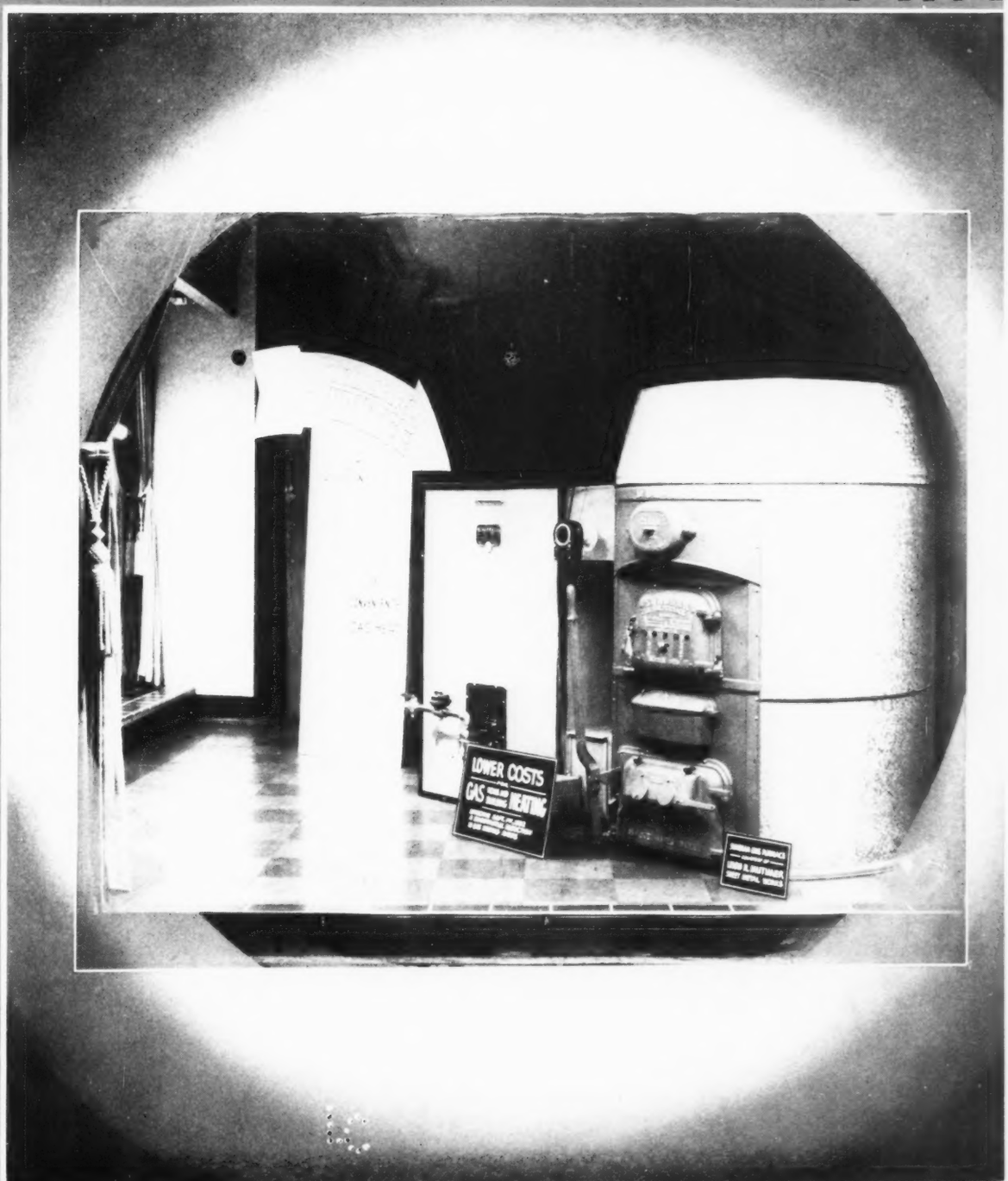
AMERICAN ARTISAN

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING



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By selling the savings of copper, many contractors are securing business at a satisfactory profit. For most home-owners will buy copper, when they appreciate its advantages . . . when they realize that, for a 7-room house, copper gutters and rainpipes cost only about $35 (national average) more than rustable metal. *Quality work pays profits.*

Leading sheet metal houses carry gutters, leaders, elbows and shoes made of trade-marked Anaconda Copper—the accepted standard of sheet metal quality. Also Anaconda Copper in sheets, rolls and Economy strips. The American Brass Co., Waterbury, Conn.

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Parker-Kalon Corporation, 190 Varick St., New York

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Imitations give imitation results

Covering All Activities
in
Gravity Warm Air Heating
Forced Warm Air Heating
Sheet Metal Contracting
Air Conditioning
Merchandising
Ventilating

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New York
Rooms 1706-1707
110 East 42nd Street
Pittsburgh
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GLOBE TRADE MARK BRAND

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because of unified control from raw material to finished product

GLOBE Brand Building material is made under a unified control that begins with the analyzing of the pig and limestone that goes into the furnace, through the making of a heat, through the rolling of the sheets, and finally through the actual fabrication into the finished product.

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SHEET METAL Building Products

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ENDURO *opens many new opportunities*

Many sheet metal contractors have come to a realization that ENDURO, Republic's Perfected Stainless Steel, is well worthy of consideration from the standpoint of new business opportunities.

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ENDURO, due to its beauty, its long life, and its resistance to most ordinarily corrosive acids, fruit juices, meats, dairy products and the like, is adaptable to a wide range of building and industrial uses. Keep it in mind when looking for new business and write today for information outlining up-to-date fabricating practice.

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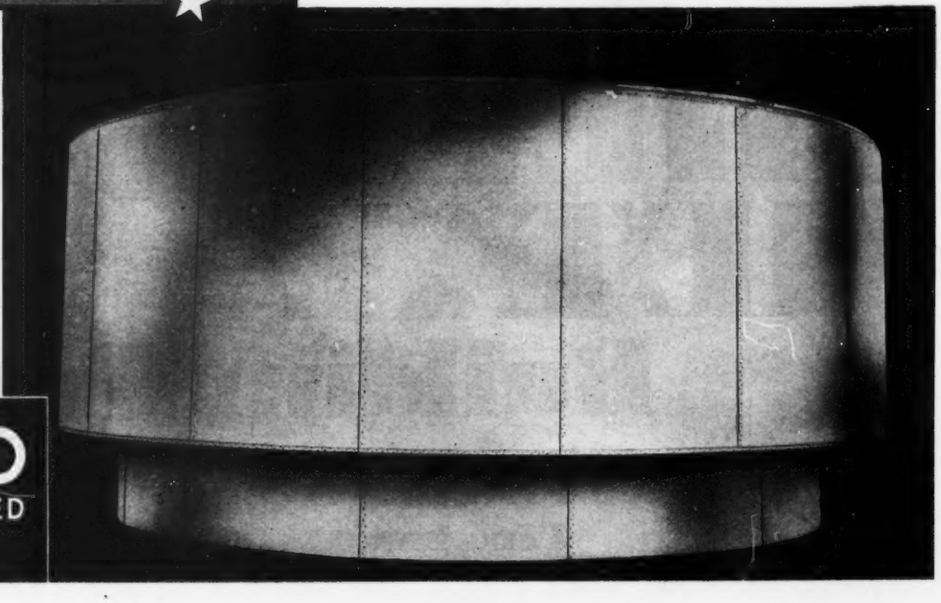

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ENDURO
REPUBLIC'S PERFECTED STAINLESS STEEL

VOLUME 102 AMERICAN ARTISAN NUMBER 1

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING

Individual Initiative Is Needed

WITHOUT a doubt the American business man has never seen a period when his thinking was so cluttered up with economics, politics, trick catch phrases and half baked prognostications as we have waded through during the last two years.

Straight thinking has been practically impossible because of the sheer mass of this conflicting publicity. The mere operation of separating applicable ideas from the huge pile of waste information is so gigantic an undertaking that most of us have thrown up our hands in despair and exclaimed—"I can't make head or tail of all this so I'll just sit back and let nature take its course."

And if there ever was a time when every business man should do some individual thinking, it is right now.

Because most of us balance our books and make out an income tax at the end of the year we automatically give the end of the year more importanec than it deserves. After all why should January incite any sudden flurries of business thinking just because it is the end of the year?

If we have been tending to our knitting we should have known at the end of any one month how our business stood and whether or not we were making money. If we were losing money, why wait until the beginning of the new year to remedy matters?

Out of this stupendous mass of wasteful, useless and time consuming argument has come one applicable idea. That regardless of what kind of business we are engaged in, this year it will be every man for himself.

Success will come only to those who have the initiative, the courage, the fortitude to think, to plan and to act as individuals.

Our businesses—warm air heating and sheet metal contracting—are no different from shoe strings, groceries, banking or washing machines. Every industry is faced with the all important fact that success will come first and only to the man who organizes his time, his thinking, his business so that it can make money today and is set to take advantage of everything the future may offer.

It should not be necessary here to point out the bright future ahead of our industries. Most of us realize that domestic air conditioning, forced air, improved gravity, ventilation, architectural metal, fabricated metal are today standing in the envious position of an industry which is looked to as the next big American development.

We should realize that this future will not be handed us without a tremendous influx of outside interests who see in this future a golden opportunity to make money. Whether or not this future will bring profits and success is not only a matter for our industries as a whole to think and act about, but a matter for individual attention and action.

The individual who thinks and acts will reap the profit.

As industries we have never ranked among the leaders in merchandising. We have been craftsmen working in a long established field requiring skill and experience—a necessary industry, but an industry left to us principally because other more aggressive industries could not see in our field enough profit to interest them.

Now this whole picture is changed. We are the industry with the bright future and fair game for every profit seeker in the country.

It should not be necessary here to itemize all the developments which have occurred and are under way. If we are not familiar with them we are already doomed to failure. Only individually do we know how well prepared we are to hold our own in this future market.

Every man individually knows whether his shop and office are so organized that he is or can make money. He alone knows whether he has the information and knowledge which will enable him to talk and sell whatever the future may bring. He may be able to bluff the customer, but he can't bluff his bookkeeping results. He alone knows whether he can, or will, or wants to sell to the end that he can hold his own with any type of competition the future produces. He alone can drive the mind and body to think, and plan, and act as circumstances dictate.

No one else can make us sit down and chart our business and its future, for only as individuals can we determine if we have the initiative, the willingness and the courage to think and drive to future success.

Whether 1933 and following years will bring us increased prestige and satisfactory profits depends on our individual aggressiveness and not on technocracy, politics, sun spots, or what have you.

Forced Air In A Large House

THAT the warm air industry has something very definite to offer the owner and architect of the large residence is a fact which is being emphasized month after month in all sections of the country. One of the best proofs of this statement and, at the same time, an unusually interesting large home installation was completed in the home of Mr. O. Lee Harrison in Dayton, Ohio in time for most of the 1931-1932 heating season.

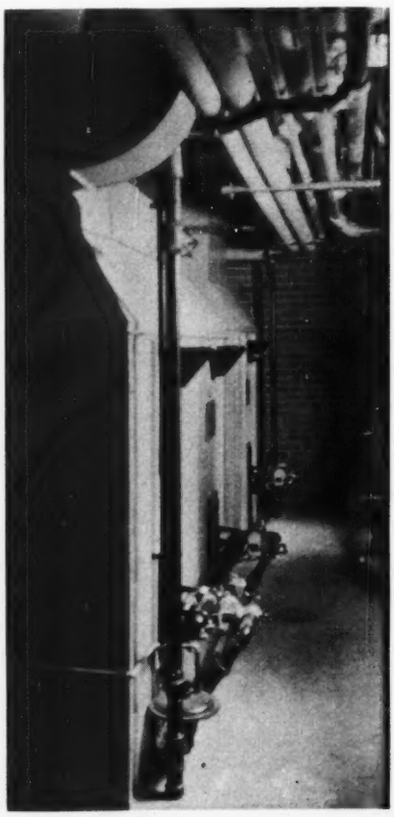
The installation was made by the Hoersting and Holtmann Company, pioneer warm air heating dealers and a firm long associated with Ohio state and national warm air heating activities.

Requirements

The system is interesting because it satisfactorily meets the owner's requirements and because the architect, Harry Schenck of the firm of Schenck & Williams who was somewhat skeptical of warm air for so large a house, has stated several times that the air is the sweetest and cleanest he has ever breathed.

This excellence of operation was not secured by guesswork, but is the result of careful analysis of the problems presented by the architectural shape and design of the house, by an understanding study of equipment suitable to the requirements and by good cooperative engineering on the part of the contractor, fan, furnace and equipment manufacturer.

The architecture and construction of the house presented the initial problems. The first floor is concrete slab and beam which necessitated spotting the riser and register openings before the floor slab was cast. Also, the house has one long axis with servants and service quarters at one end. Because of the contour of the ground there is a difference of several steps between the level of the service basement and the main basement. Duct work has to be tailored to these various levels and the passageways between.



View looking along the front of the three furnaces. Above is an exterior of the residence

Duct Locations

One of the real problems of the installation was to find space for the large number of ducts. In spite of the large area of the house and the basement, some rooms are to be devoted to activities which prohibit duct work showing in these rooms. For instance, the basement has a play room and an organ room which houses the mechanical parts of the organ. Ducts could not be carried through the play room, but had to be carried through the organ room. Because of the necessity for constant air pressure inside the organ room, an air-tight door seals the room from the rest of the basement. The duct for the play room is carried through the partition above the door and is tightly insulated against air pressure loss. Return from the play room is carried through an

underground duct to the furnace room.

Use is made of another underground duct for the rooms at the back side of the main wing to eliminate one large overhead duct through the basement hall.

How to get the necessary ducts to the servant's wing presented another problem. The hall goes down several steps and is not wide enough to carry both lines. The problem was solved by bringing the return along the hall ceiling and taking the supply through partitions to the inside garage footing wall.

Equipment

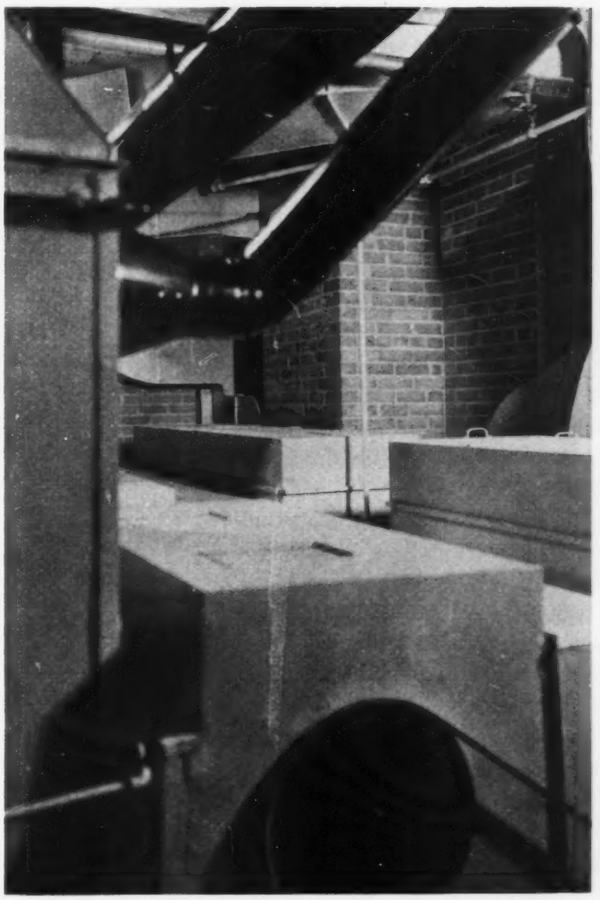
Three furnaces are required for the house. Two furnaces are arranged in a battery and serve the main wing. The other furnace has its own return and supply system and heats the service wing. The furnaces are gas-fired units housed in special casings designed and fabricated by Hoersting and Holtmann. The construction is shown in one of the details.

The two furnace battery has two blowers with louvres, while the single furnace has one blower. The blowers are housed in special cabinets to conform with the space requirements of the furnace room.

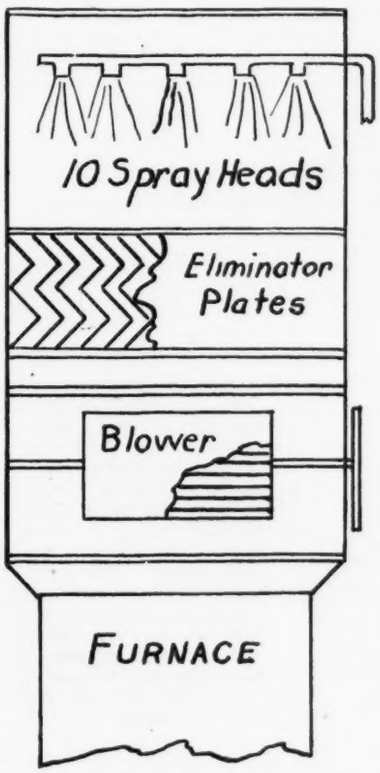
The system also uses washers for cleaning and humidifying. These washers were made by the Hoersting and Holtmann Company and have since been placed on the market, patents having been issued to L. J. Hoersting. The placing of heads and the general arrangement of washers, plates and blowers is shown in another detail. There are 19 spray heads for the double blower and 10 heads for the single blower unit.

The blowers draw the return air through the washer sprays and then through a five-faced bank of eliminator plates to insure removal of all surplus water.

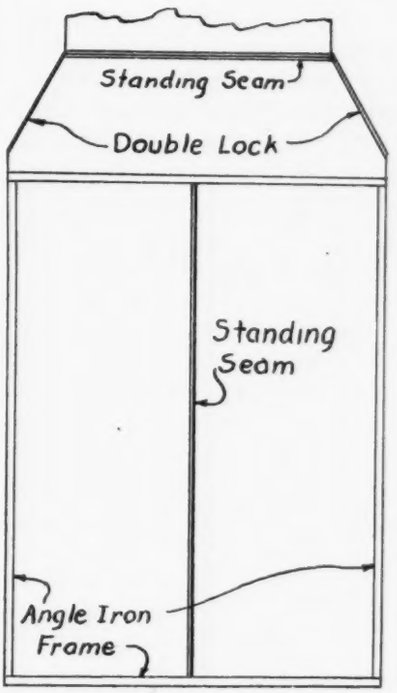
Controls are of the usual arrangement with house thermostats controlling the operation of the gas burners and bonnet controls operating the blowers. Both blower



The space between the back wall and the furnace housings is filled with blower, eliminator and washer housings. Both blower and washer cabinets have man-holes for inspection. The underground returns and outside air intake come into this room behind the washer or against the back wall. This picture gives a good idea of the amount of equipment required for this house



The washer, eliminator housing, blower and furnace are arranged like this—a "pull through" system. There are 10 spray heads in the single washer



The casings were especially fabricated for this job and were assembled like this. Restricted air passages were made with a tight reflector sheet with corner cut-offs. The angle iron frame is on the outside

units turn on at 175 degrees and off at 100 degrees, this wide spread permitting more than usual length of fan operation.

Natural gas with a 1150 B.t.u. content is being used.

General Design

The system is based on the use of low velocities ranging from 400 feet per minute through the mains to approximately 200 feet per minute at the registers. Ducts vary from 14 inches depth for the service furnace and 12 inches for the double furnace at the bonnet to 8 inches in the branches. All ducts are standing seam construction without any clips of angles for reinforcing. Pittsburgh locks are used at all four corners. Ducts were delivered knocked down.

The system was designed on the B.t.u. heat loss method with the following coefficients of heat loss used —glass 1.1; wall .20; ceiling and floor .25; infiltration .02. The register temperature used is 135 degrees, or a temperature difference between inlet and return of 70 degrees.

The B.t.u. supply per hour from the large twin is 249,375 while that from the single is 148,940. These figures include a safety factor of 25 per cent for both the main section and for the service wing. Cubic feet per hour for the main section is 195,945 and for the single 117,-030.

It is evident from the piping plan of the furnace room that ingenious fitting was required to get all the metal work placed in this small room. The arrangement worked out brings all return into the washers at the back wall, with some of the air entering the housings from under the floor and other ducts dropped down from the ceiling. A general picture of the arrangement is given in one of the photographs which shows the blowers and washers and some of the metal work.

Most of the details of distribution can be seen on the first and second floor plans. Features especially worthy of mention are, however, found in practically every room.

The basement piping plan shows that outside air is introduced into the blower housings through an underground round pipe. The purpose of this outside air is to provide some control over humidity if control is necessary and also to give some portion of air other than that recirculated. A manual control is provided for this supply.

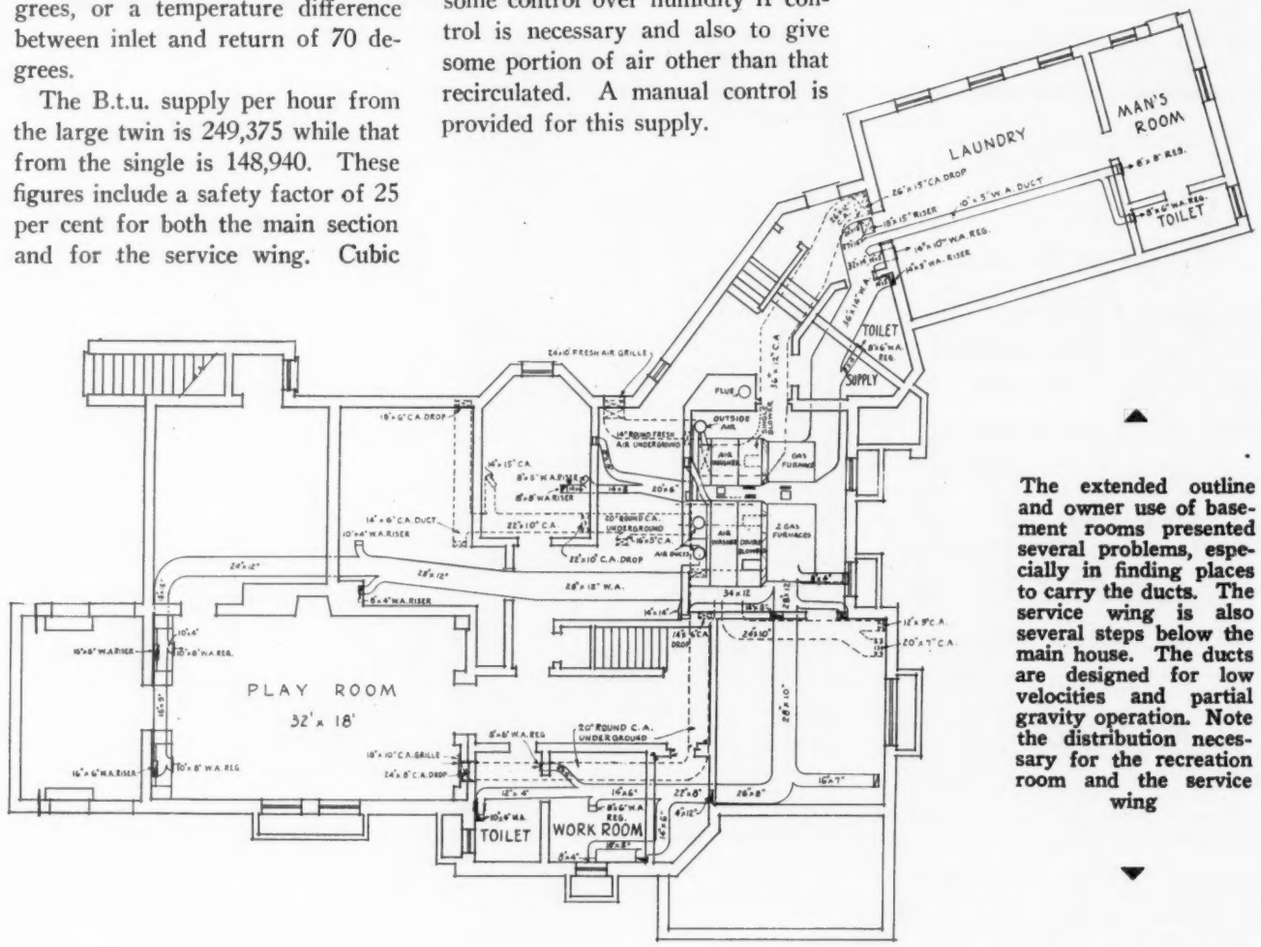
All metal work—furnace casings, blower and washer housing and exposed ducts are painted with buff Duco applied with a spray gun.

First Floor

The largest room heated is the living room which is slightly larger than the basement play room. Warm air is introduced from one end and outside wall with the outlet in the opposite wall in wood paneling. Another return which serves this room is located in the organ alcove and was placed there to insure movement of air through an area of the living room which might be dead.

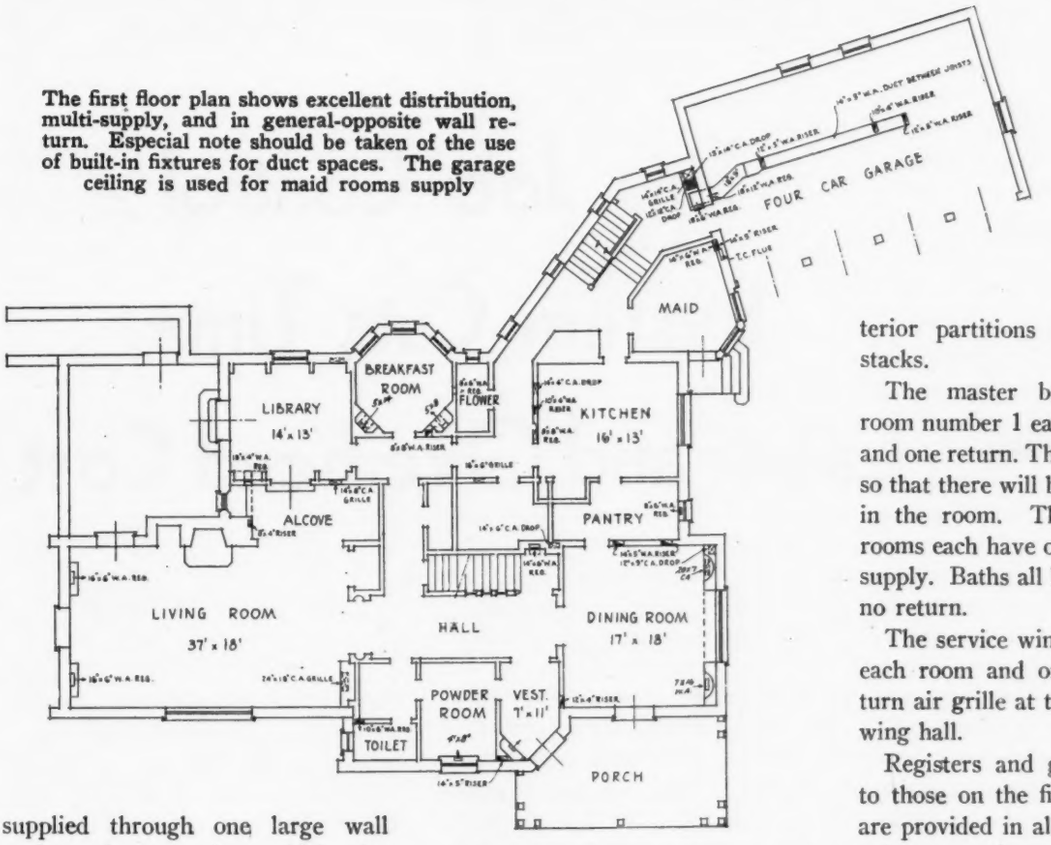
The library, toilet, powder room, vestibule, hall and kitchen have supply, but no return, while the dining room, and breakfast room have both supply and return.

The garage ceiling is used for ducts to the servant's bedrooms above. Temperature in the garage is set at 55 degrees with warm air



The extended outline and owner use of basement rooms presented several problems, especially in finding places to carry the ducts. The service wing is also several steps below the main house. The ducts are designed for low velocities and partial gravity operation. Note the distribution necessary for the recreation room and the service wing

The first floor plan shows excellent distribution, multi-supply, and in general-opposite wall return. Especial note should be taken of the use of built-in fixtures for duct spaces. The garage ceiling is used for maid rooms supply



supplied through one large wall register from a riser which also heats the rear hall. The duct for second floor rooms is run between joists and plastered in.

Registers and grilles on the first floor are two piece stamped faces furnished in light statuary bronze and nickel. A few faces are black plated iron finish polished. All registers are located at the baseboard or a few inches off the floor.

One of the interesting features of the design is the splendid use made of built-in cabinets, chimney and flue masonry, and furred out walls for stacks to the second floor.

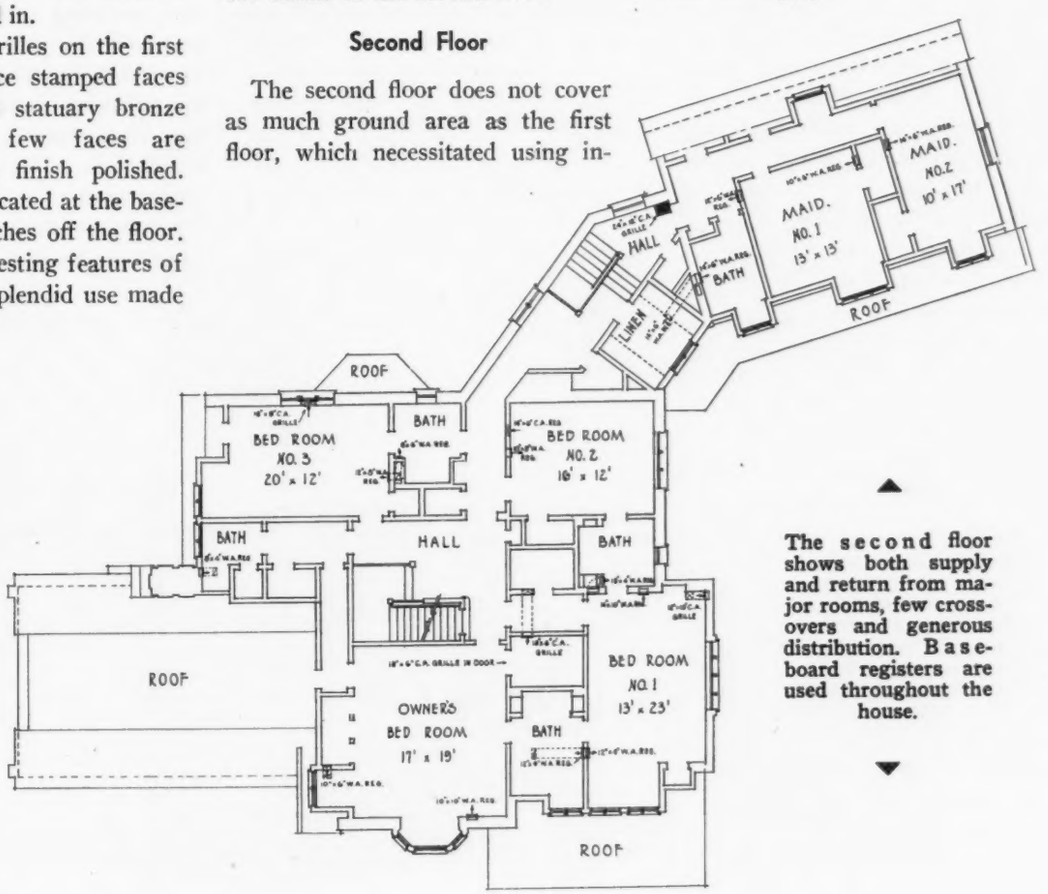
Second Floor

The second floor does not cover as much ground area as the first floor, which necessitated using interior partitions for most of the stacks.

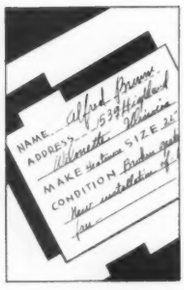
The master bedroom and bed room number 1 each have two inlets and one return. These are distributed so that there will be no dead pockets in the room. The other two bed rooms each have one return and one supply. Baths all have one inlet and no return.

The service wing has one inlet in each room and one large floor return air grille at the entrance to the wing hall.

Registers and grilles are similar to those on the first floor. Valves are provided in all supply faces but valves are taken out of the returns so that the system can't be shut off from air supply.



The second floor shows both supply and return from major rooms, few crossovers and generous distribution. Baseboard registers are used throughout the house.



This Job Control System Cuts Time, Labor and Overhead Cost

HOMER SELCH is known in Indianapolis and throughout much of Indiana as a furnace merchandiser of the first water. Prior to this year his annual volume has been more than sufficient to warrant his classification among the leaders of the state.

Much of his success he attributes to the organization of time, labor and material handling which he has developed. This organization was sound enough to enable one office girl to handle all details of a business which sold and installed and cleaned several hundred furnaces and, in addition, handled a very sizeable amount of all kinds of sheet metal work every year while business was good.

The plan has also simplified shop and office operations this year when cost and bookkeeping systems have had to be stretched all out of shape in order to picture what actually is going on.

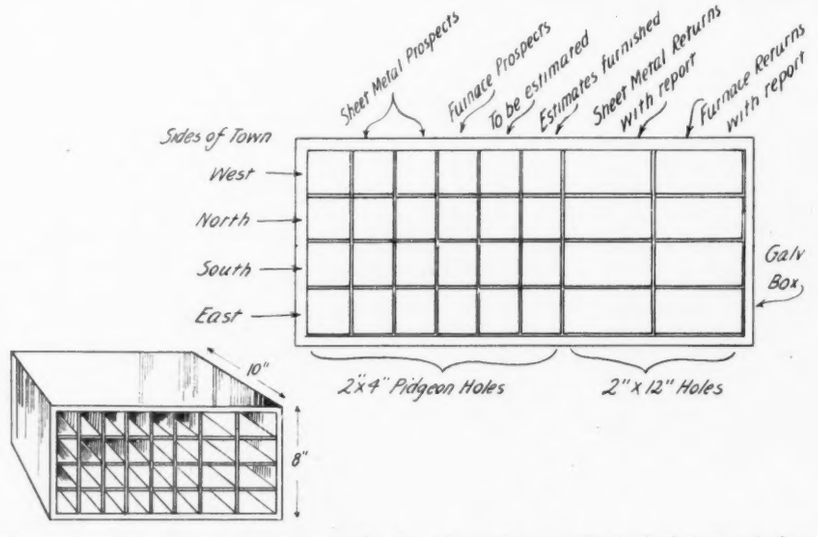
The illustrations show the basic items used to keep track of cleaning, furnace selling and sheet metal contracting operations.

On a table in the office the sheet metal file which is shown is used to keep exact track of all work in process. This cabinet was, of course, built in the Selch shop. This is how the file is used.

In the first tier of holes the pads of tickets are kept. The four shelves are allotted to the four sides of Indianapolis—north, south, etc. The second and third tiers of holes are used to file sheet metal prospect cards. The fourth tier holds furnace prospects, the fifth tier furnace calls which must be estimated. In the sixth tier these estimates are placed after figuring and until a salesman is ready to submit the price. In the two large end tiers furnace and sheet metal returns and reports are filed prior to transfer to the order book or to the shop for fabrication.

Two typical tickets are also shown. One ticket is used for furnace work and the second for sheet metal work and cleaning.

Here is the method of using the system. If a call comes in over the 'phone all the information which can be obtained is filled in on the proper ticket. This ticket is then filed according to the part of town in which the job is located. The driver or the salesman then takes the ticket and makes out his routing for a day's calls or several hour's work. Upon visiting the job, supposing the person wants an estimate on a repair job, all information secured by an inspection is filled in



The control system centers around this box in which are filed all tickets relating to jobs. Tickets are routed through the box according to the designation of the various pigeon holes

HOMER SELCH
Sheet Metal and Warm Air Heating
844 Virginia Ave. Drexel 2773-4

Owner _____ Job No. _____
Address _____ Date _____
Phone No. _____ Date promised _____
Work to be done at _____
Date Bill _____ Price _____
Name _____
Nature of work _____

Items Used

Ft.	Ft.	
		Pipe
		Pipe
		Tee
		Drawband
		Collar
		Angle
		Ell
		Thimble
		Cleanout
		Nails
		Wire
		Paper
		Paste
		Cement Furnace
		Bolts
		Grates—Long
		Grates—Short
		Grate Circle
		Chains
		Pulley
		Labor
		Labor
		Labor
		Cement
		Lime
		Sand
		Incidentals

Trip or Hauling _____
Estimate Price _____
Estimate by _____
Work Satisfactorily Completed
Signature _____
Use other side for material not listed.

At the left is a job ticket on which time and material are entered. Costs are taken off this ticket by the bookkeeper for comparison with estimates. The ticket is routed from the estimator, through the mechanic and salesman and then to the bookkeeper

At the right is a telephone entry order. This is filed for the mechanic so that the time entered can be met promptly

on the ticket and the ticket placed in the hole for estimates to be made.

When the estimate has been prepared and the price filled in the ticket is again filed in the "estimate made" hole where a driver or a salesman takes it to the prospect. At the same time a card is mailed out acknowledging receipt of the inquiry and stating that the estimate will be made and rendered immediately.

This system has made it possible for salesmen and drivers or mechanics to route themselves so that little time is lost wandering about the city. By synchronizing this ticket system with the bookkeeper's books complete information on all work in process is kept from day to day and mistakes are held to the minimum.

Homer Selch has devised some other interesting ideas used in connection with this system. For example, a driver or mechanic is paid 25 cents for all bills collected when the work is completed or the driver leaves the material. Last year this premium resulted in maintaining a sound relationship between work completed and work paid for.

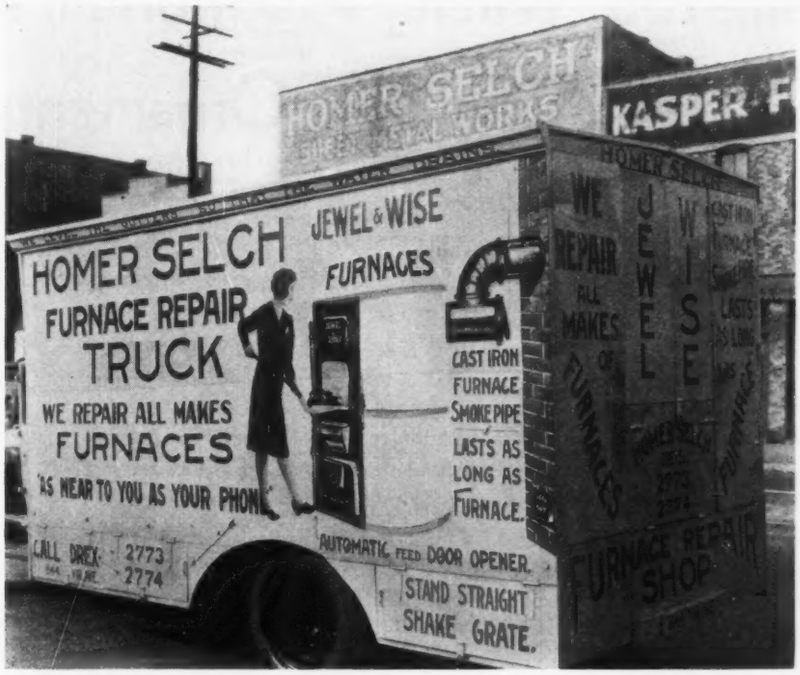
Since trucks play such a large part in this firm's operations, truck costs have been worked out so that this expense is not deducted from net profit. Every trip a truck makes is charged $1.00 against truck cost. Also, when a truck lays over while a job is in progress this time is charged against truck expense. In 1929 these charges paid off two-thirds of truck operating cost in the course of the year.

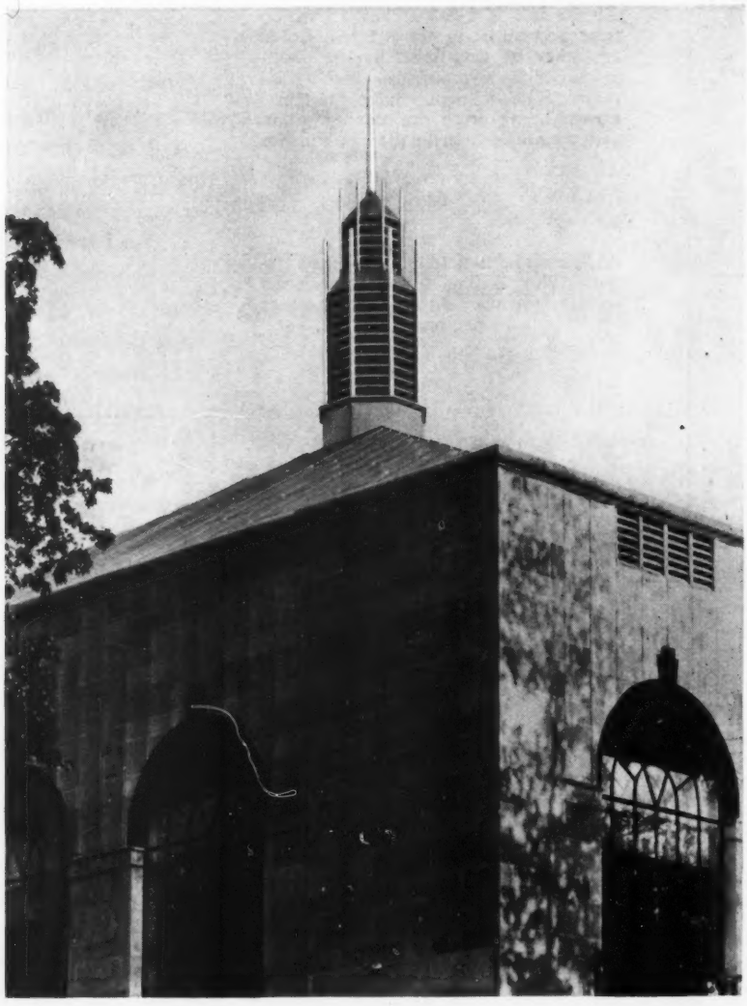
HOMER SELCH
Sheet Metal and Warm Air Heating
844 Virginia Ave. Drexel 2773 - 4

Owner ..... Job No. .....
Address ..... Date .....
Phone No. ..... Date Promised .....
Work to be done at .....
Date Bill ..... Price .....
Name .....
Nature of Work .....

The "sheet metal shop on wheels" as the Selch trucks have been called have been talked about before. These trucks have, however, proved their worth during good times and now during poor times. They have saved time, shop and job expense and of equal importance very definite advertising helps.

This "sheet metal shop on wheels" has been one of the profitable advertising mediums for Selch service. The trucks are, at the same time, definite time and labor savers. Practically every tool and piece of material needed to do furnace and sheet metal jobs are carried in this truck. Costs for operating this type of truck have been accurately determined and allotted to proper cost departments





The ventilator is the dominating ornamental feature of the civic auditorium. Unique design and fabrication were used to meet the architect's specifications. The roof is copper

Kalamazoo, Mich., Auditorium's Aluminum Ornamental Ventilator

ON the Civic Auditorium, recently completed in Kalamazoo, Michigan, there is a unique ventilator which, in addition to providing a necessary service, is the dominating ornamental feature of the building.

This dominance is due to two things—the location of the ventilator on the roof and the striking appearance of the metal sheath. While the ventilator is not unusual in size, its striking design is emphasized by the use of stainless steel contrasted to the copper sheeting on the roof and the light colored stone of the walls.

In selecting the metal to be used, this matter of appearance was carefully considered by the architects. They wished a tower which would retain its color and which would harmonize in color with the stone facings of the walls. Stainless steel, KA2 number 4, was chosen.

In order to meet the architect's design the sheet metal contractor—the Kalamazoo Sheet Metal Manufacturing Company—had to resort to several unusual fabrication methods. For example, each of the eight louvred sides of the ventilator are placed between standards which serve to hold the louvre panels and extend above the panel as a standard. The upper set-back section is constructed in a similar manner and the finial is identical in all but size with the lower standards.

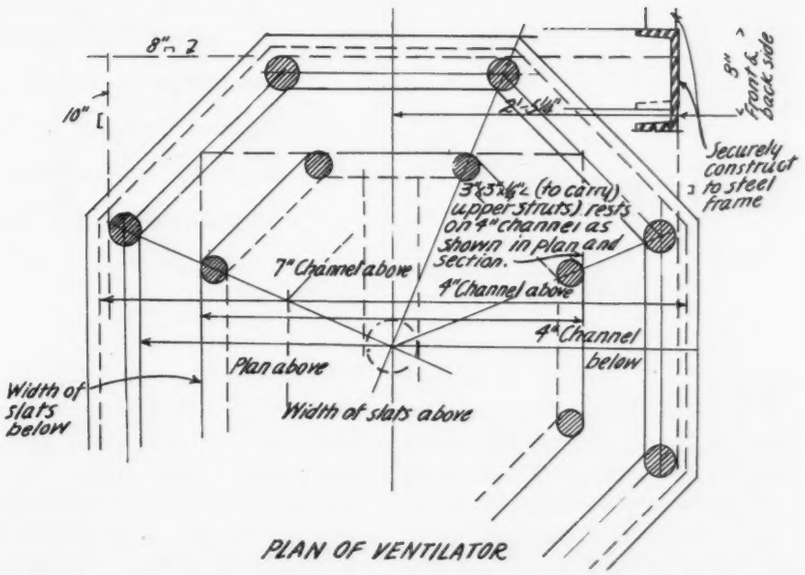
These standards are made from seamless drawn tubing in sizes of 2, 3, 4, and 5-inch diameter. The brass pipe was first nickel plated and on top of the nickel an outside coating of chrome plating was placed,

with high polish finish. The purpose of this coating was to match the standards in coloring with the blades and panels of the stainless steel louvres.

Each of the eight faces consists of a series of deep bladed louvres —11 blades in the lower faces and 5 blades in the upper face—with a steeply sloped cap. The louvres are 16-gauge K-A-2 stainless steel, satin finish, formed with a turned down bottom edge and a turned up top edge for fastening to the standards. In fastening, $\frac{5}{16}$-inch brass machine screws were used. The standards were tapped on the inside for these screws so that no screws are visible from the roof.

The general construction is indicated in the drawings. Both lower and upper standards are carried down to structural channels at the base of the ventilator. The standards are capped with ½ brass ball castings chrome plated.

Behind the blades a copper screen is placed to keep out birds.



The above plan of the ventilator shows the outline of the two steps in the faces and the frame which was used as support

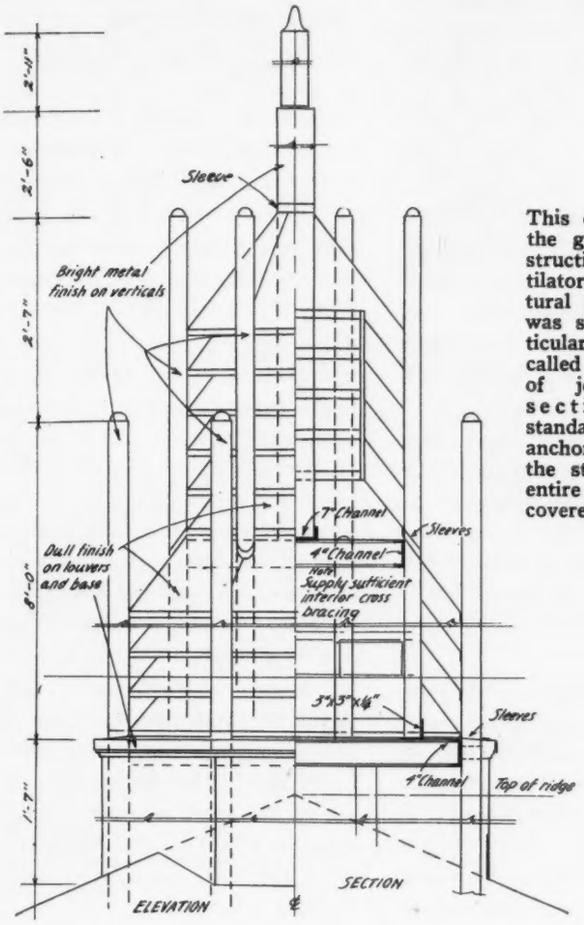
The base of the ventilator is steel formed with flat faces under a shallow molding. The lower standards which pass through this base are run through sleeves of steel.

The roof of the building is copper sheets laid as self-forming battens. Each sheet has one edge formed as a loose roll. Adjoining sheets are formed with a larger roll. The two rolls were slipped together and pounded down. Cross seams are hammered locks without solder. At the ventilator base the roof sheets are carried up behind the base in the form of a high flashing.

The general appearance of the roof and the ventilator is shown in the photograph. There is no cornice of metal, because the stone work is finished off with a rolled coping.

The Kalamazoo company reports that no trouble was experienced with the stainless steel. The metal proved tough and harder to shear than copper and iron, but it worked well in the brake and proved stiff when once formed. Another interesting feature is the appearance due to weathering. The company states that several months' exposure has seemingly removed all oil traces from the metal bringing out a more glossy finish.

Many favorable comments have been received by the architects and the sheet metal contractor for the design and fabrication of this ornamental ventilator. The ventilator shows how an intricate design when handled by a sheet metal contractor who knows his business can be interpreted in terms of metal and skill.



This detail shows the general construction of the ventilator and the structural frame which was sheathed. Particular attention is called to the method of joining louvre sections with the standards and the anchorage used for the standards. The entire ventilator is covered with aluminum

Bodily Comfort

[Part I]

A series of articles presenting in plain language useable sales points which your customer can understand. The air conditioning contractor will find in this series the answers to most comfort questions.

By L. W. Millis

BEFORE we try to analyze "Bodily Comfort" it might not be amiss to recall that practically all theories of man place his origin in a warm climate. His physical construction is such that within his own organism he can unconsciously adjust himself to various warm temperatures, but he has no means of adjusting himself to extreme cold. He has developed no fur. Neither can he develop rolls of fat for cold weather protection. Nor can he indulge in hibernation which is the method of passing the winter used by some mammals. His only protection in cold climates is clothing and artificial heat.

To discuss "Bodily Comfort," we will assume that our bodies are under no handicap of unnatural conditions that cause discomfort, that the air surrounding our bodies is free from abnormal dusts, noxious odors, or poisonous gases. We can ignore such theories as the presence of carbon dioxide crowd poison, ionization, ozonation, violet rays and a host of others whose advocates are struggling to prove their worth to humanity. For the purpose of this discussion we will assume that our bodies are surrounded by plain garden variety, everyday air and will consider just three properties of air.

The Three Properties of Air

These three properties are temperature, humidity, and motion. With the exception of a few necessary detours and a few voluntary side excursions, our discussion will be on these three things. To indicate what is meant by side excursions, let us take one right now on "temperature."

It is not so long ago that the measurement of heat was in a chaotic state. Most of us can recall such statements as—"hot as mush," "cold as ice," etc. Someone noted that water at sea level absorbed a uniform amount of heat between freezing and boiling. He divided this into 180 parts and called each a degree. Then the question arose of how cold anything could possibly be. In the highly learned manner of that day, they determined that 32 degrees below freezing was the limit. Today, for practical use, this incorrect zero is useless.

The Livable Temperature Range

Man can, in some manner accommodate himself to a range of temperature from 40 degrees below zero to 115 degrees or more above. Later it was found that if a cubic foot of gas at zero is cooled one degree that it would shrink 1/460 of its volume. Therefore, it could shrink 460 times to become nothing and, therefore, zero in temperature would be 460 degrees below our present zero. This is called absolute zero. It would be much more convenient in heat calculations if all temperatures were read from absolute zero. When we wanted to say it is freezing (meaning freezing water) we would read the thermometer at 492 degrees. On a pleasant 60-degree spring day we would call it 552 degrees and feel just as comfortable.

The heat of the sun is 15,800 degrees. We would then have a range of temperature of 15,800 + 460 or 16,260 degrees. You can see that man's position in nature's range of heat is exceedingly narrow. If we could have a thermometer 30 inches high with divisions small enough to register the entire range of 16,260 degrees, we could locate the entire range of man's activities in a space about ½ inch high about 1 inch from the bottom of the thermometer. The space in which he is comfortable would be about 1/40 of an inch, not far below the top of the ¼-inch space. This indicates how small a space man occupies in nature's range of temperature. Notwithstanding this narrow range, some men travel to the ends of the earth to spend their days within that little 1/40 of an inch range. All of us spend much time and money to create within our homes and other gathering places the conditions that bring comfort in that narrow range.

Heating Is Really Cooling

Air is the immediate requirement of our lives. Also the condition of the air is as important as the air itself. When we warm our habitations, many people think we do so to warm our bodies. We warm a room to 70 degrees and think we did so to warm our bodies. But the temperature of our bodies is normally 98.6 degrees. Our bodies are continually losing heat. If our body temperature rises much above 98 degrees and stays that way, we send for a doctor. If it falls much below 98° and stays that way very long, we also send for a doctor. If we don't believe in doctors we follow whatever method we use in lieu of physicians. If we do not do one or the other and the condition continues long, our friends send for an undertaker. Our bodies are always losing heat and we only warm or cool our rooms so that the heat lost from the body may be at a comfortable rate.

. . . the problem corner

Creosote Trouble

American Artisan:

I have a furnace that collects creosote. So much creosote collects that the owner dips it out of the clean out door.

A new flue with a brick and tile lining was built two years ago, but the trouble still persists.

The owner is using dry wood for fuel.

The chimney is on the outside of the house and on the north side.

Can you tell me the cause of creosote formation and suggest a remedy for this particular job?

H. A. B., Indiana

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Reply by
G. A. Voorhees, Indianapolis

I can't give you any authoritative information about creosote formation or its prevention but I'm sure you can get it from the University of Illinois, Urbana.

Several years ago I had a lot of trouble with a job over at Decatur, Ill., where an oversize furnace was used in a fan system and the furnace operated most of the time with the check draft open.

A hard, black, scaly substance formed throughout the upper parts of the combustion chamber, radiator and smoke breeching. I took a sample of it to Urbana and was referred to someone in the Department of Chemistry who was well posted on fuels and combustion. From the specimen I submitted, he told me the whole story of the formation of such a crust instead of soot and even named the particular section of Kentucky (and I verified this afterward) from which the coal came.

I'm quite confident that someone down there can give you really reliable data both on the formation and prevention of this creosote, if H. A. B. will send a sample and the information to the university.

◆

Reply by
F. G. Sedgwick, Minneapolis

Creosote is a product of incomplete combustion in a fuel which is highly volatile.

Certain woods and certain volatile coals are creosote forming.

Creosote is a gas distilled from a fuel and condensed by the colder air of the smoke pipe or chimney or on the smoke pipe or chimney itself when the temperature of the distilled creosote is brought below the condensation point.

There are two preventatives.

1. With a high creosote fuel never burn a low or smoldering fire. Keep up a hot fire—hot enough to burn the creosote or hot enough to keep the creosote in suspension until it is passed out of the chimney.

2. Do not use a check draft. Be careful that all of the joints in the smoke pipe are tight. Control the fire by the positive damper in the smoke pipe and the damper in the ashpit door only. Do not allow the gases in the smoke pipe to become chilled until they have passed out of the building.

With creosote it is well to slope the last joint of the smoke pipe downward slightly so that creosote will not run into the smoke pipe from the chimney. It is well also to cut off this last joint diagonally, allowing the upper or overhanging part to extend into the chimney to deflect creosote around the smoke pipe opening.

Creosote is something that bothers most in mild weather when a light fire is being carried and usually disappears during extremely cold weather when a hot enough fire to burn the creosote is required.

The type of heater does not make so much difference. The principal difficulty comes from the smoke pipe or smoke pipe connections.

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Reply by
A. H. Kundee, Dowagiac, Mich.

We have had experience with quite a number of creosote trouble jobs, however, we have never found any sure method of completely stopping this trouble. On furnace heating systems, the following will lessen to a certain extent the formation of creosote:

Eliminate the usual check damper in the smoke pipe and install the enclosed Butterfly type of damper.

If the smoke pipe is long, wrap this with corrugated asbestos paper to keep from chilling.

Keep the small draft in the feed door closed.

If an outside chimney is used and wood is used as fuel, we have found it just about impossible to stop the formation of creosote.

We have not had a great deal of experience with the formation of creosote in circulator installations, however, we have found that keeping the small damper in the feed door closed will help, and if it is creosoting very badly, by reversing the smoke pipe the liquid will be carried back into the heater.

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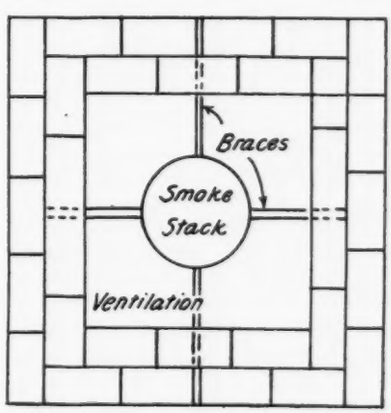
Smoke Stack Iron

American Artisan:

I am a reader of your magazine and would like some information on the following question:

What kind of iron is best for use in a smoke stack when the stack is placed inside a brick ventilator such as we use in Wisconsin rural school houses? The diagram will show how the stack is located.

Some claim that black iron is best. Others say galvanized iron is best. I have also heard of a new metal where the galvanized coating is fused on black iron.



What gauge iron should be used for this stack which is ten or twelve inches in diameter and about 40 feet high?

I have considered cast iron, but I have never heard of cast iron in these sizes suitable for smoke stack. If any manufacturer or contractor can give me some suggestions his reply will be appreciated.

E. H. K,
Wisconsin.

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Reply by the Editors

Harding and Willard's Mechanical Equipment for Buildings states—"Cast iron and steel are often used in chimney construction where the metal linings are placed in a larger brick flue so that the space between can be used as a vent space. For small diameter stacks not over 40 feet high, tank steel, not over ¼-inch thick is suitable. All vertical seams at sections should be lap riveted and circular seams be made with outside butt straps."

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Reply by Samuel R. Lewis, Chicago

We consider 14-gauge black steel suitable for a stack of this kind. No reinforcing for seams is necessary as the stack can be braced to the outside brick work. Heavy galvanized iron might be used, but there is some danger from corrosion with certain kinds of fuel.

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Chimney Down Draft

American Artisan:

I would like to get some suggestions for remedying a down draft in a chimney. This chimney top sets on a low, one-story building. Next door on one side is three-story building, about 20 feet away. On the other side is a two-story building, about 45 feet away. The front and back of the building on which the chimney is located are clear.

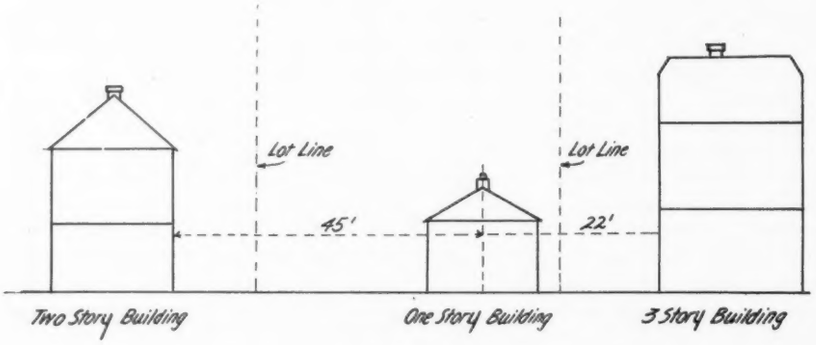
The chimney tile is 12 inches in diameter. There is one 8-inch furnace pipe and one 6-inch laundry stove (with damper) using this flue.

The trouble is most pronounced on windy days when the wind seems to come down off the three story building into the chimney causing a troublesome down draft. Sometimes there is a regular whirlwind between the buildings above the chimney.

The draft is not too good at any time, but if there was no down draft the chimney would work satisfactorily.

My idea is some sort of a top which would draw, would not catch soot, and would keep air from going down the chimney.

F. K.,
Michigan.



Reply by The Editors

In cases of this kind the usual remedy is to add enough smoke pipe to raise the chimney top above the level of adjoining buildings. The reason for doing this is that down drafts are caused by whirling motions of the air in pockets between buildings.

It is obvious from your drawing that this common remedy will not be suitable for your job because of the height of the adjoining building. There remains, then, some remedy which will keep air from going down the chimney regardless of outside air motion.

If the usual type of two way chimney cap is installed results may be unsatisfactory when the wind is from certain directions. What these directions are would have to be determined by a lengthy study of the wind currents.

We believe, therefore, that the best remedy is the application of some form of ventilator which will let the warm and lighter air out and still keep the cold wind out regardless of wind direction. This suggests a revolving or turbine type of ventilator.

We suggest that you write ventilator manufacturers and get their guarantees for this job.

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Reply by L. P. Halleck, Detroit, Mich.

The ideal method of eliminating the problem in connection with the flue of the one-story building would be to extend this flue up above both of the adjoining buildings. This method of solution, however, cannot be applied on account of objectionable appearance and cost.

It will therefore be necessary to place on this chimney some sort of a mechanical exhauster which will create a negative pressure or semi-vacuum condition in the space directly above the chimney, thus accelerating the rise of the gases and smoke up the chimney.

As the combined cross sectional area of the 8-inch furnace and 6-inch laundry stove connections into this flue is only 78½ square inches, it will be noted that the cross sectional area of the chimney, itself, is 113 square inches, and has the proper ratio of cross sectional area over that of the incoming connections.

Therefore, certain detrimental physical conditions of the chimney and flue should be looked for which are conducive to the proper functioning of the chimney and which every furnace man is no doubt familiar with but which are not always investigated closely to reveal them.

I refer to the following:

1. Obstruction in the flue of the chimney. A small hand mirror should be held through the cleanout opening at the bottom of the chimney at such an angle as to observe whether there are any such obstructions.
2. The flues from the heating appliances may extend beyond the inner surface of the flue liner.
3. The sections of the flues from the heating appliances may not fit tightly and thus permit air leakage.
4. There should be no space where air can enter at the point where the furnace or heating appliance flues enter the chimney.

The outer structure of the chimney may permit air leakage into the flue liner. A careful inspection of the outer structure with the aid of a burning candle, held at the crevices where the mortar has become disintegrated, may reveal an inward suction into the chimney. In many cases the flue liner becomes fractured or broken or the mortar disintegrated between the joints, thus permitting a suction through the outer structure of the chimney. Pointing up the spaces between the stone, brick, or cement blocks will prevent this air leakage.

There may also be a possibility that there is a starved air condition existing in the building and this should be eliminated by providing for outside air intakes of sufficient area to eliminate this condition. If, however, for one reason or another an entirely

satisfactory air intake cannot be provided, a turbine type of ventilator, with an inverted displacement cone of the 12-inch size, should be used on this chimney. This type of ventilator consists of a rotor with blades curved over its throat in such a way that any outside air action, regardless of the direction from which it is coming, makes it revolve, creating a negative pressure directly above its throat. When placed on a chimney the ventilator causes smoke and gases to rise at a greatly accelerated speed.

This ventilator should be set a foot or two above the chimney on a transition piece that is cemented and bolted to the chimney in such a way that it will not only be absolutely rigid but will not permit of any air leakage. In every case, the cross sectional area of the throat of the ventilator should be equal to the cross sectional area of the chimney flue.

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Tinning Milk Vats

American Artisan:

Can you tell me the best method for retinning cream vats? These vats are made of copper and are about 3½ feet wide, 4 feet deep, 9 feet long and built in the form of a round bottom U. The coil runs through the center and is used to either cool or heat the contents.

The constant churning of the cream, which contains an acid, wears off the bright tin surface.

The usual cleaning process is to remove the coil and clean both coil and vat. Usua'ly the vat is allowed to dry for one day and is then tinned.

What materials should be used for cleaning and what materials and methods should be used to re-tin the inside of the vat? If possible I would like to use a wide flame torch.

R. C. L.,
North Dakota

◆

Reply by
Doerre Hardware Co.,
LaCrosse, Wis.

While we have never done re-tinning on vats as large as this, if we had the job we would clean the vat with hot muriatic acid. After the acid had eaten well into the dirt rinse the surface with water. As a re-tinning agent we would use zinc chloride solution.

Reply by
Jacob Brenner Co.,
Fond Du Lac, Wis.

We recommend the following method for cleaning cream vats and coils. First clean the surface with a steel brush. If the surface is unusually dirty clean with muriatic acid and rinse with cold water. Next heat the surface with the large flame torch and apply tinning compound with a hack saw blade or soldering iron and wipe while hot with steel wool or cloth.

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Reply by
Minn-Kota Mfg. Co., Fargo, N. D.

Our tinning compound is really not meant for re-tinning such large surfaces as described by your reader. However, we believe that the compound will work out satisfactorily. A good method is to use a torch such as suggested by the inquirer, take a handful of steel wool rolled into a ball and dip the ball into the compound. Then while keeping the surface hot with the torch rub on the compound with the steel wool ball.

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Reply by
Bjornson & Wessel Co., Omaha, Neb.

We have come in contact recently with a product which is not widely known, but which is excellent for tinning. This product is called "Tinfast" and is a patented material. It can be used to tin any metal, no matter how rusty or dirty.

All that is required is to heat the material which is to be tinned and sprinkle a little of the compound on the metal. The compound immediately becomes bright and gives as satisfactory a tin coat as new material.

We find this process saves about 95 per cent of the labor required to solder cast iron and is wonderful on automobile bodies and fenders. We are sending you the name of the manufacturer so that the reader who has the vat tinning problem can buy it.

◆

Reply by
Damrow Brothers, Fond Du Lac, Wis.

We have done very little re-tinning of exactly the kind you note, but the usual procedure is to clean and pickle the interior with muriatic acid. A prepared tinning compound is then used. The compound which we use comes in a paste form and is applied to the surface with a brush or a rag. The surface is then heated with a torch and wiped with a rag or cotton waste while the tin is still in a molten condition.

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Reply by
F. B. Adams, Lake Geneva, Wis.

I have had little experience in re-tinning such a large vat as this one. However, our practice for small vats should apply satisfactorily. We use a torch with a wide flame, heat the metal and apply powdered Salamoniac to clean. Then while keeping the metal hot with the torch apply solder and wipe with good clean cotton waste.

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Cleaning Bronze Doors

American Artisan:

Can you give me information on the proper method for cleaning bronze or brass doors. We have a theatre with bronze doors set in bronze casings. The metal is covered either with lacquer or varnish, we don't know exactly which. These doors are very dirty having been exposed for some time.

A. G. S.,
Michigan

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Reply by
The Editors

If these doors are lacquered it will be necessary to remove the lacquer finish by applying lacquer thinner. If the doors are varnished remove the varnish with varnish remover or gasoline.

Either lacquer or varnish may also be cleaned by applying a solution composed of 50 per cent sulphuric acid and 50 per cent muriatic acid. This solution should be applied with a brush, working the solution into all crevices. The solution should be left on for a short time and then washed off with clear, warm water.

For very cold weather some shelter must be provided to prevent freezing, or remove the doors and take them indoors.

If the doors are plain surfaced the grime may be removed by rubbing with a very fine pumice or emery. This will dull the finish and the doors should be relacquered or varnished.

The replies to readers' questions published in this section were secured from men who have had experience with these problems. Undoubtedly many of our readers have solved these problems and can give us valuable help. Your solutions are invited.

Frank Finds

The line of kitchen equipment Frank DeWeese has developed is frankly designed to meet a price market. The units are simple in design in order that shop costs will be low. In addition to standard items, any type of special will be furnished to meet the buyer's specifications. Sales of these items have helped to iron out dull periods.

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"IN the last ten months we have scrapped practically every idea on selling, shop operation and installing that we developed during previous years and have substituted for these ideas new plans based strictly on conditions as we find them here in Ft. Wayne in 1932."

So states Frank DeWeese, sheet metal and furnace dealer in Ft. Wayne, Indiana, and one of the active workers for better business conditions in the trade.

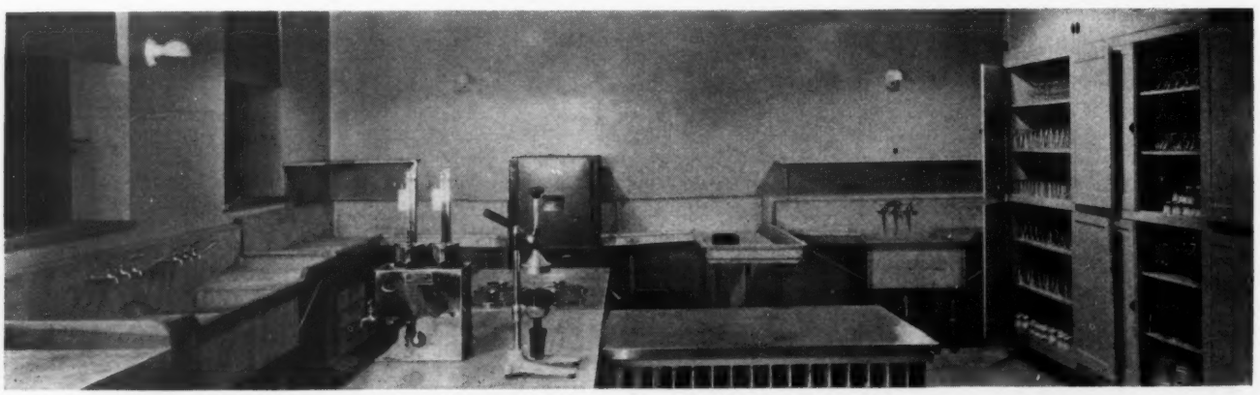
"For instance, during the years after the war and until 1930 we extended credit to home owners, and buyers of our sheet metal work and gambled on getting our money. Of course, we did not extend this credit promiscuously for we have never been such a large shop that we did tens of thousands of dollars of work a year. Nevertheless, within our financial limitations, we did use credit to an extent which brought worry over dead accounts and failure to pay.

"Today these credit losses have been cut down by the simple expedient of shutting off credit and going on a cash basis. I might illustrate this point by citing our furnace repair work. This year every owner who wants parts and repair service must pay cash for the parts before we order them. In the past too many parts were ordered and remained on our floor for weeks until the owner collected the money. Worse yet, lots of repair jobs were installed at our expense while we waited long periods to collect for parts and labor.

"We've carried this idea of changing previous policies throughout every phase of our business. We believe that this idea of scrapping old ideas has been beneficial. In our own business, at least, it has opened our eyes to types of work we never would have thought of going after five years ago.

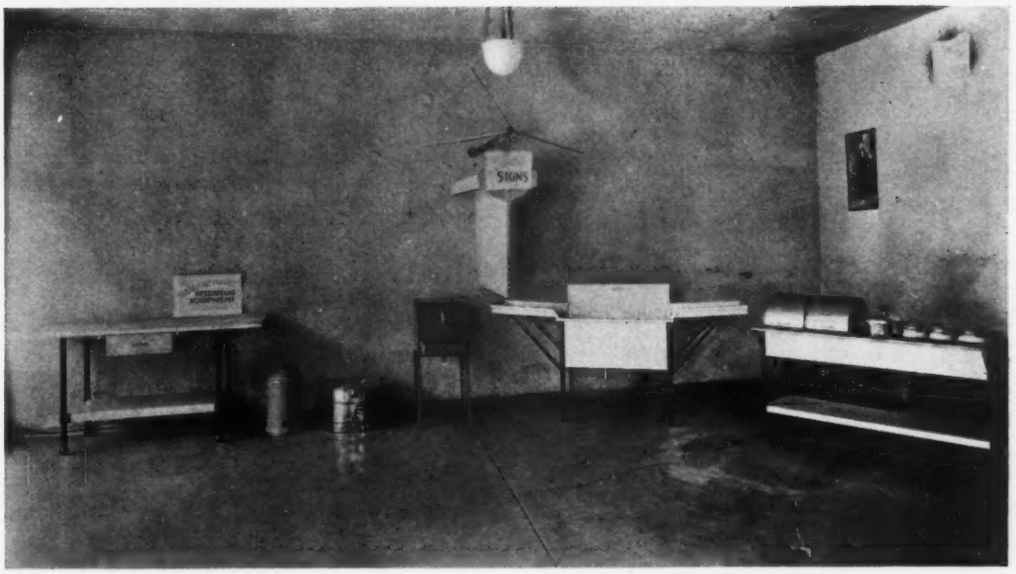
"Of course, just thinking about new ways to get business is only the beginning of the problem. There are lots of things which can be made in a sheet metal shop, but are financially impracticable because it costs too much to dig up prospects and make sales. Nevertheless, we ourselves have worked into several lines of manufacture which have tended to iron out poor weeks and bring in some much needed cash.

"For instance, some months ago we discovered that there are a whole lot of restaurants around this part of the country needing new and re-



The photograph above shows equipment furnished in the Marsh Hotel in Van Wert, Ohio. Note how DeWeese has filled out wall spaces by using standard designs in special sizes. Table and radiator tops were also made to specifications

DeWeese, of Ft. Wayne, Ind., Kitchen Equipment A Profitable Sideline



The photograph on the opposite page and the view to the right show two sides of the DeWeese show room. One side displays the firm's line of furnaces and accessories, while the kitchen equipment, store signs and specials line the opposite wall. The show room was formerly used by an automobile agency

placement equipment. Restaurant equipment gets hard wear. Units like tables, sinks, washing and cleaning tops and boards wear out at a surprising rate. We also discovered that owners of eating houses are just as anxious to save money today as any of the rest of us.

"It was only a step, then, to the development of a low priced line of tables, sinks, serving and steam tables and other items which are easy to fabricate and give the sheet metal contractor a chance to compete with the regular restaurant equipment firms.

"We have developed this line of specialties over a period of several months. Perhaps we have been lucky, but we have been able to sell an encouraging amount of such equipment. The price is high enough to give us a profit and payment is prompt. So far as the shop is concerned we fabricate and assemble these units during hours when there isn't any regular work.

"One thing should be emphasized. We early found that for standardized units even the small shop can't compete with the big manufacturer. Where we get the edge is in arrangements requiring special lengths of tables, drains and work shelves to fill out a wall space or meet an owner's specifications. This is demonstrated in the installation we made in the Marsh Hotel in Van Wert, Ohio. This job demonstrates how every available inch of wall space was used for working tables and sinks. Standardized units were out of the question for every length was odd sized. Merely adding a few inches or cutting off our standard patterns was an easy job for us.

"This line of restaurant equipment is frankly low priced. The units on our display floor show that the tables are serviceable, but simple in fabrication. So also are the sinks and steam tables. These units are built to stand up reasonably well, but are not sold as the last word in appearance or lifetime service.

"Last winter we heard of a cigar manufacturer who gives his outlets a sign to hang out in front. This sign consists of a two faced display board with a shallow canopy holding electric lights above. The canopy is formed in one sheet and the board is metal faced, without any ornamentation. The cigar manufacturer painted these boards in his own shop and wanted them shipped knockdown for ease in shipping and less shipping cost.

"We assembled a sample and quoted a price based on fill-in time cost. We got the order for a few signs and have since built several dozen. The profit is not large, but the pay is prompt and we can use this work to advantage along with our other shop work."

Frank DeWeese has had his ups and downs in Ft. Wayne. He was one of the hard working contractors who established the Standard Code in the building code of Ft. Wayne. He was the first inspector under the code. Political complications cost him his post and he opened up a shop in his home garage. The present excellent display room and shop is the result of several years' work and growth.

This display room is one of the best in Ft. Wayne. It is not a

Above is another view of the Marsh Hotel equipment, much of which is stainless steel, specially designed for the kitchen. The hood was also built by DeWeese

"gilded lobby" to use DeWeese's expression, but it is clean, light, in a down town location and large enough to permit the showing of the specialties, the DeWeese furnace line, and the various special items which he sells.

Most of the sales made in the specialties are contacted from following all reports of remodeling and new construction. When there is no shop work to be done DeWeese and his son, who is in the business with him, canvass schools, restaurants and all possible users of the equipment.

This specialty work is, of course, secondary to furnace and sheet metal work. But in Ft. Wayne remodeling and new furnace work have been greatly curtailed because of conditions so that so far this year most of the furnace work has consisted principally of repairing. Roofing and sheet metal repairs on homes and commercial buildings has long been one of the major activities of this contractor. Such work has likewise fallen off, but is still one of the fields upon which sales emphasis is laid.

"We feel," says DeWeese, "that our efforts to develop new lines of activity are in no way sensational. Rather, they are only our effort to apply the things which larger companies have found beneficial when established fields of activity have fallen off. Probably thousands of other contractors have done the same thing, but contractors who have overlooked saleable items which can be fabricated in the average shop during spare moments have either failed to heed one of 1932's major lessons or are willing to sit down and let conditions run away with their business."

Wisconsin Association Program

THE Sheet Metal Contractors Association of Wisconsin will hold its annual convention in Milwaukee February 6 and 7 in the New Pfister Hotel. Arrangements have been made for a valuable meeting with addresses by authorities and entertainment of the usual Wisconsin character.

The program announced tentatively is as follows:

MONDAY, FEBRUARY 6

9:30 A. M.
Meeting of the Board of Directors.
Registration.

10:30 A. M.
Appointment, Committee of Credentials.
Report of Officers:
Appointment of Committees.
Committee Reports.
Unfinished Business.
Proposal and Election of New Members.
Address: Stainless Steel and Its Possibilities, Mr. C. C. Snyder, Republic Steel Corporation, Massillon, Ohio.

2:00 P. M.
Address: Operation of the Unemployment Insurance Law, F. H. Clausen, The Van Brunt Manuf. Company, Horicon, Wis.
Address: The Future in the Remodeling of Old Homes, C. M. Riefkin, Manager of the Advertising Dept., The Newport Rolling Mills, Newport, Ky.
Eection of Officers.

TUESDAY, FEBRUARY 7

9:00 A. M.
Address: Should the Sheet Metal Contractor Apply and Sell Prepared Roofing and Siding? G. H. Hamrich, Certainteed Products, Milwaukee.
Address: Business Trend for the Furnace Dealer, D. C. Ellison, Northwestern Stove Repairs Co., Chicago.
Address: Credits and Collections, W. J. Joy, President Republic Metals, Inc., Chicago, Ill.

2:00 P. M.
Mechanical and Heating Air Conditioning Session.
How to Design an Air Conditioning System, Guy A. Voorhees, Indianapolis, Ind.
Application of Air Filters, Q. G. Ewen, Independent Air Filter Co., Chicago.
How to Regulate This Mechanical Work, John F. Jaap, Cook Electric Company, Chicago.
How to Sell Air Conditioning Equipment, I. W. Rowell, Lakeside Company, Hermanville, Mich.
Discussions.
A special invitation is herewith extended to the ladies to attend this Convention. Provisions have been made for their entertainment. A ladies' committee has been appointed to take charge of all ladies and this committee will make arrangements and provide for their wants during Convention time.
Committee: Mrs. A. C. Goethel, Paul L. Biersach, Walter Belau, R. G. Suettinger, C. C. Tolg.

7:00 P. M. Banquet in Sky Room, Upper Floor.

Fan Physics

[Part II]

By Platte Overton

This is the second article of Mr. Overton's series. The purpose is to give readers some conception of the physical laws behind fans and their operation. Questions and comments are invited.

"Power" is the rate of doing work. In work and energy only two factors, i. e., "force" and "distance," are elements. In power "there is a third factor—"time." A machine that does a certain amount of work in one minute must be larger—more powerful—than another which does the same work in 2 minutes.

This element of time is important to heating, ventilating and air conditioning readers. C.f.m. is cubic feet of air "per minute." Here we have force—moving the air to the room—the distance—from the fan to the room—and the factor of time, or so many cubic feet of air **per minute.** We turn the fan slowly and get a given number of cubic feet of air to the room in "some" length of time, but to get this given volume of air to the room with the same fan in one minute we must expend **power.**

Formula (c)

The power of a machine is determined by calculating the work which it does per unit of time.

The formula is $P = \frac{W}{t}$

where: **P** = the average power expenditure during the time interval **t**, stated as a number of work units of the given denomination, per selected unit of time

W = the work during the time interval **t**, stated in any desired unit of work

t = the time expressed in any desired units of time in which the given quantity of work, **W**, is done.

Example: To get water into a tank (Fig. 6) the water must be lifted 40 feet. The pump-lever makes 25 strokes per minute. The quantity of water pumped at each stroke is 10 pounds. What rate of doing work or what power is being expended while the water is being pumped? By formula (b) the work done at each stroke = W FL = 10 × 40 = 400 foot-pounds. The time expended in doing this quantity of work = 1 ÷ 25 = 0.04 min. Hence by formula (c), the power developed

$= P = \frac{W}{t} = 400 \div 0.04 = 10{,}000$

ft.-pounds per minute.

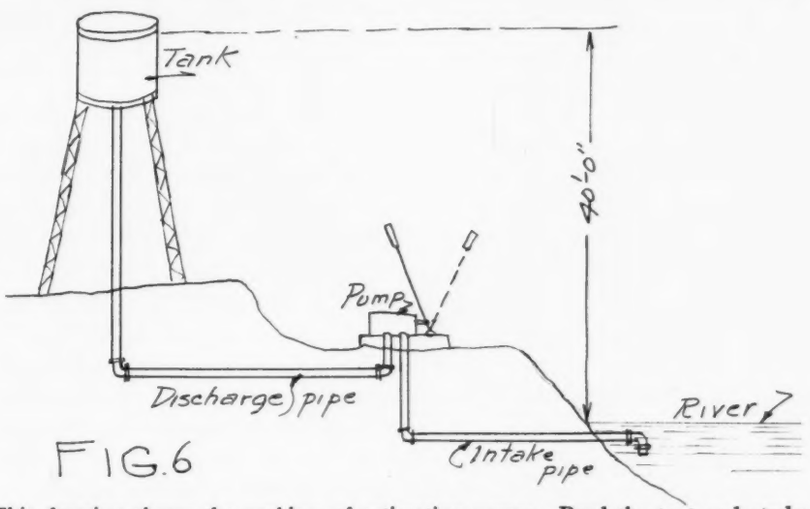


FIG. 6

This drawing shows the problem of estimating power. Read the text and study the drawing and you should be able to explain power, whether pump or fan

Formula (d)

"Horse Power" (H.P.) is a unit of power and is the power expressed by doing the work at the rate of 33,000 ft.-pounds per minute. The average power in H.P. units which is developed by any apparatus for doing work may be computed by the formula $P = \frac{FL}{33{,}000\ t}$

where: **P** = the average power or rate of doing work in horse power, during the time interval, **t**, in which work is done

F = applied force in pounds

L = the distance through which the force acts in feet.

t = the time in minutes during which the force is applied

Our weight (Fig. 5) weighs 800 lbs. A motor lifts it 6 ft. 6 in. in 30 seconds. What horse power is the motor developing? The distance is 6.5 = L.

$t = 30 \div 60 = 0.5$ min. Hence

$P = \frac{FL}{33{,}000\ t} = (800 \times 6.5) \div$

$(33{,}000 \times .05 = 0.315$ H.P.

"Air Horse Power"—As the reader is interested in the horse power to move air, the theoretical formula will be discussed. As pressures are generally given in "inches of water," they must be changed to the equivalent ounces per square inch, hence to pounds

per square foot or foot-pounds per minute. The equivalents in ounces per square inch and "inches of water" will be found in table 1.

Problem: What is the theoretical horse power required to move 3,000 c.f.m. against 0.35 inches of total pressure?

From table 1 we find that 0.35 inches of water is equivalent to 0.2 ounces per square inch, and change this to pounds per square foot or $\frac{.02 \times 144}{16} = 1.8$ pounds per square foot. This represents the expenditure of energy at the rate of 1.8 foot-pounds per minute.

Hence each cubic foot of air moved against a total pressure of 0.35 inches will require a theoretical horse power of $\frac{1.8}{33{,}000} =$ 0.0000545 H.P.

$0.0000545 \times 3{,}000 = 0.1635$ H.P. or 1/6 H.P. approximately.

We must remember that fans are not 100% efficient. Standard fans will vary in efficiency from 30 to 70%, 70% efficiency being high. If our fan is 45% efficient we have: $\frac{0.1635}{45} = 0.363$ H.P. required.

Motors are likewise never 100% efficient; 75% efficiency is a good average. Thus our actual requirement would be $\frac{0.363}{75} =$ .485 or ½ H.P. approximately.

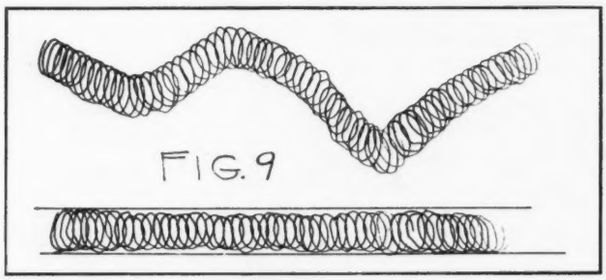
As we have discussed horse power, energy, work, pressure, etc., a short discussion on the "centrifugal" fan may not be amiss.

The word "centrifugal" is explained as: tending or causing to fly off from the center; radiating from a central focus; expanding first at the summit and later at the base; etc.

This force may be demonstrated by a simple experiment. Fill a small pail about half full of water and whirl rapidly in a circle over the head. Note that the water will not spill out, even during the time the pail is directly upside down. This is due to the centrifugal force or pressure of the water against the bottom of the pail.

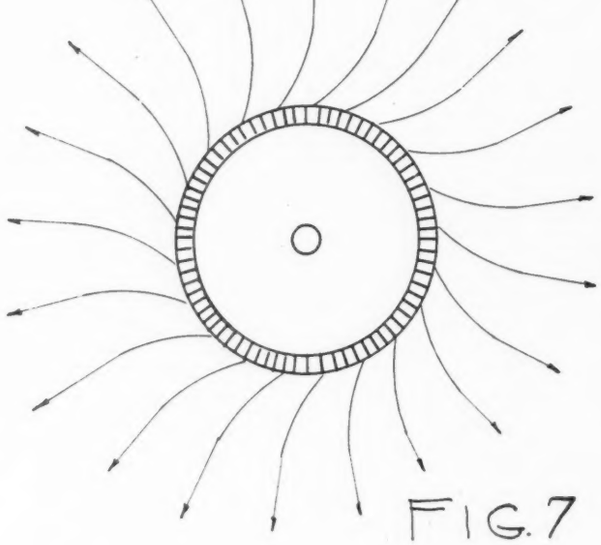
If we remove the wheel of a centrifugal fan from the housing and rotate it rapidly in the open, the air currents will fly out in all directions that are at right angles to the rotor (Fig. 7). Here we have the demonstration of energy, but before it becomes serviceable we must house it. The housing is generally made in the form of a scroll (Fig. 8). When we place the scroll around the wheel we partially obstruct the flow of air and set up a compression which is called "static pressure." However, in all centrifugal fans there are two separate sources of pressure. The first is the centrifugal force, and the other is the energy (kinetic) due to the velocity of the air leaving the edge of the wheel.

A fan housing serves the same purpose as a spring's tube. Without tube or housing energy cannot be controlled or used



The "kinetic" energy of this flow of air must be changed into potential energy before it can be used in ducts, and this is the office of the scroll. We may further convert the "kinetic" to "potential" energy or, let us say, velocity to static pressure by flaring the fan outlet or adding a diverging nozzle. We might think of this energy in the terms of a long, helical torsion spring. If we attempt to compress it, it would fly in all directions. If it is compressed and cased in a steel tube (Fig. 9) its potential energy may be used and directed as desired. Our scroll around the fan fills very much the same purpose as the casing around the spring.

There are hundreds, yes, thousands of different designs of fans, blades, housings, bearings, etc. It is not the purpose of this article to discuss their relative merits. This discussion will explain what goes on inside the "works" and makes it tick.



If there were no housing around a blower air would be thrown away like this. Power and pressure would be present but not usable

The National Warm Air Heating Association December Meeting

IN the opinion of practically every man attending, the twentieth annual convention of the National Warm Air Heating Association, held December 7 and 8 in Urbana, was "the most instructive and valuable assembly of addresses, research reports and inspections held by the association."

Much of this value must be accredited to the choice of Urbana as the convention city because this location permitted inspection of the research residence and the university laboratory where so many tests have been made in addition to hearing the reports of investigations and then seeing the actual system on which the tests were run.

For many of the contractors, and manufacturers' representatives as well, this year's visit to Urbana was their first inspection of the laboratory and the research residence. How interesting this visit proved is indicated by the fact that a stream of guests passed through the house from early morning to late at night. At times the basement was jammed with dozens of visitors carefully inspecting all the apparatus and asking questions.

W. L. McGrath
President

An interesting sidelight on this year's visitors was expressed by one of the university staff at the residence in his statement: "It almost seemed as though every visitor before he left home had written out questions he wanted to ask. The scope of these questions, many of which we cannot yet answer conclusively, show that the contractor has been meeting and solving problems in advance of the progress so far made in our tests. It is surprising how much important data these contractors have established as practical and usable by the cut and try method of design and installation."

With air conditioning and forced air work so prominent in the industry's mind it was natural that the reports covering cooling, controls, duct design, humidification, circulation and allied subjects should draw most attention and interest. The reports presented by the research staff were both comprehensive and practical. Some of the reports contradicted ideas pretty well established by field practice, but in every such case sound reasons why different results or different methods should be used were demonstrated. Most of the visitors agreed that these reports were probably of most importance.

Following is an outline of the preliminary report presented:

I. Investigation of Forced Air Heating System.

1. General discussion and description of plant.
2. Preliminary results on air washer.
3. Results on control systems.

II. Investigation of Summer Cooling.

1. General discussion and description of plant.
2. Selection and control of test conditions.
3. General results.

a. Adaptability of forced air system.

b. Allowable velocity of air at registers.

c. Overall ice meltage.

d. Basement losses.

e. Roof and attic temperatures.

4. Relative humidity and dehumidification.

H. T. Richardson
First Vice-President

W. L. Rybolt
Second Vice-President

Allen W. Williams
Managing Director and Treasurer

5. Actual and calculated cooling load.

6. Effect of outdoor temperature on cooling load.

7. Effect of awnings.

8. Seasonal cooling load.

9. Daily variation in outdoor temperatures.

10. Results of tests on unit coolers.

11. Conclusions and recommendations.

These investigations were reported by Professors A. C. Willard and A. P. Kratz and by S. Konzo and Mr. Hubbard of the research staff.

A number of important papers were delivered during the sessions. While it is not possible to report all of these papers in full, the high lights of the papers are published with this report.

Among the business matters transacted was the election of officers, names being shown in an accompanying column. Reports were submitted by several committees accompanied by extemporaneous discussions of several practical problems.

The entertainment was confined to the Wednesday evening banquet presided over by Tommy Richardson in the absence of W. L. Rybolt who could not attend. The guest speaker was Professor Russell of the Commerce School of the university. While Professor Russell's address was packed with humor and witticisms there was an underlying note of seriousness covering the present depression with some discussion of contributing causes and some interesting observations on probable trends and future developments. Professor Russell's talk was declared one of the best heard at any association convention.

An important feature of the meeting was the admittance to membership of several firms, some of which had formerly been members; others new to the association. These firms are:

American Foundry and Furnace Co., Bloomington, Ill.

Faultless Heater Co., Cleveland, Ohio.

Gerofair Co., Toledo, Ohio.

Officers for 1933

President—W. L. McGrath, Williamson Heater Co.

First Vice-President — H. T. Richardson, Richardson & Boynton Co.

Second Vice-President — W. L. Rybolt, Rybolt Heater Co.

Treasurer and Managing Director—Allen W. Williams.

Directors (Two Years)

L. R. Taylor, International Heater Co.

F. E. Mehrings, Meyer Furnace Co.

R. W. Blanchard, Hart & Cooley Mfg. Co.

Directors (Hold Over)

Clarence Olsen, Fox Furnace Co.

A. W. Wreiden, Holland Furnace Co.

A. C. Willard
Director of Research

Henry Furnace and Foundry Co., Cleveland, Ohio.

Owens-Illinois Glass Co., Toledo, Ohio.

In addition to these manufacturers a number of individual contractors and contracting firms were also admitted to membership.

A vote was taken and passed selecting Chicago as the convention city for 1933. As the meeting will be held after the Century of Progress opens, it was felt that members would like to see the fair while attending the convention. Definite dates and the convention hotel will be decided by Harvey Manny and Ralph Blanchard, the committee appointed.

More than 200 registrations were listed. This registration was divided between contractors and manufacturers or their representatives with a higher percentage of contractors than at any previous meeting. A number of guests attended but did not register, stated Allen W. Williams, managing director.

In the opinion of many, meetings should be held in Urbana more frequently, especially as forced air and air conditioning assume places of more importance. Such a program will permit contractors to study tests and ask questions at the place of test.

Convention Addresses Are Published on Pages Following

Report of Research Advisory Committee

F. G. Sedgwick

IN the Monthly Bulletin of the Engineering Experiment Station of the State College of Washington, Volume 14, No. 10, for the month of March, 1932, the following statement is made:

"The annual domestic coal bill for the United States is approximately $800,000,000.00. The average efficiency at which this coal is burned is indefinite, but an optimistic figure would probably not exceed 50 per cent.

"When the average home builder considers the installation of a heating system in his new house, he too often lays principal emphasis on first cost of equipment rather than upon yearly cost of operation and heating economy. Manufacturers of heating equipment have been forced by this fact to build and sell furnaces of low first cost and such furnaces usually have a very low operating efficiency. Since the heating plant perhaps affords more comfort than any other integral part of the home, it should have far more careful consideration than is usually given to it."

I am not reading you this quotation because I agree with it, though I do to some extent, but I am interested in this quotation, and you should be interested in it too because it is a layman's opinion of our industry.

Assuming that one-half of the estimated amount, or $400,000,000 is spent in warm air furnaces, and assuming that 10 per cent of this amount could be saved to the furnace consumers of the United States, we begin to draw a picture which points strongly to the value of research.

Sell Only Best

How futile it is for furnace manufacturers and furnace dealers to vie with each other in an effort to see who can install the cheapest furnace, when all of us know that we best can serve the consumer's interest, not by installing the cheapest furnace, but by installing the best furnace.

I am strongly of the opinion that, by and large, here is one industry in which the consumer cannot profit by insisting on cheap goods. The consumer pays for a good furnace utimately, and if he puts in an inefficient furnace he ultimately pays more for the cheaper furnace not only in dollars but in lowered comfort and impaired health.

What do you think would happen if every furnace dealer in the country should suddenly stop talking about how cheap a job can be made and start talking about how efficient it can be made?

I wonder how the furnace business would like to split up that $400,000,000 possible saving in Uncle Sam's fuel bill every year? Most of us furnace manufacturers would, I am sure, be willing to trade our present profits for our share of this amount.

I am saying these things, primarily to show that there is real justification for the research work that is being done by the National Warm Air Heating Association.

Perhaps you have never thought of it individually, but the harm that is accruing to the warm air furnace business through faulty installations and through faulty merchandising methods is a direct result of the excellence of the business itself.

Furnace Is Versatile

A warm air furnace installed according to the Standard Code with register temperature of 175° will do one thing; a warm air furnace installed to heat the house at a register temperature of 350° may also heat the house, if heat is the only thing we consider, and the dealer who installs a furnace in this manner may get his pay for the job and may be able to undersell the Standard Code dealer by a considerable amount. Thus you will see that the wonderful flexibility of our heating medium has made it possible for the dealer, who looks only to the immediate sale, to beat the more conscientious dealer out of a job, and to get by with it.

The fact that our product goes into homes, gives our business a credit stability that results in abuse which many another business could not stand for a moment. It makes it possible for manufacturers to carry our dealers much too long, with some degree of success, and this virtue of our chosen profession—good credit—has led to the abuses of easy credit, has shielded us from the severe but necessary lessons of hard credit, and I am afraid for that reason that we are not, as a profession, as good business men as we would be if we were like the automobile men and had to pay for all of our goods C. O. D.

I wonder if you fellows sitting out there in front of me are just listening to another report, or if you are really thinking with me. If you are willing to think with me I am going to spend just a few minutes in the manner of a popular Radio program to sell you on what has been done. Here is a chance for each one of you to make up your mind in just a few minutes how well you have followed the work that has been done here at Urbana.

1. What calibrating equipment was found necessary to properly measure air velocities, and what special instruments and devices have been developed by the Research Staff at Urbana for this purpose? See Bulletin No. 112, page 18.

2. What is the ratio of emissivity between very rusty black iron pipe, galvanized iron pipe and properly covered warm air piping? See Bulletin No. 117, page 18.

3. Name the effective processes for the purpose of heating air and describe each of these three processes. See Bulletin No. 120, page 121.

4. What is the most efficient type of furnace bonnet? See Bulletin No. 141, page 69.

What is the best type of liner for a furnace casing? See Bulletin No. 141, page 96.

5. What, if anything, is to be gained by pitching a pipe between the furnace bonnet and boot? See Bulletin No. 188, page 53.

6. What, if anything, can be gained by insulating a long leader pipe? What is the value of ceiling insulation? Read Bulletin No. 189, pages 108 to 114.

7. What are the evaporation requirements to maintain relative humidity of 40 per cent in zero weather? Read Bulletin No. 230, page 22.

8. How much should a furnace man be interested in the effects of wind and sunshine in connection with his efforts to install truly satisfactory heating systems? How much leader pipe can one safely take off from a given furnace casing? See Bulletin No. 246, pages 107 and 147.

Research Program

9. How should a furnace job be figured to assure a homeowner of adequate heating service? Read the Standard Code, 8th edition.

10. How can a manufacturer or dealer best do his share to perpetuate the benefits of our research program? Read all the bulletins and publications of the Research Staff. They are full of meat. Be willing to pay for the information that you obtain through your membership in the National Warm Air Heating Association. It is a live, working organization. The benefits of its research program are so great as to be beyond the possibility of measurement, and the future offers even greater promise than the past.

Our program as laid out last year on forced air heating and air conditioning has just been started. It will be continued this year without interruption on a materially lower budget cost. There is enough work in that program to keep us busy all of this year and perhaps for a longer period of time.

The research work on filters and washers conducted as a part of this program at the University of Minnesota under the direction of Professor Rowley and with the cooperation of the American Society of Heating and Ventilating Engineers and a group of filter and washer manufacturers is just getting under way, having been delayed by summer vacation and the necessity for the preparation of a filter and washer testing code.

Merchandising—What May We Expect In The Future?

E. W. Nesbit

GREATER changes will probably take place during the next five years in our industry than during the past twenty-five years. If you agree wholly or in part with this prediction, then we all, whether manufacturers, distributors, jobbers or dealers, must radically change our methods to properly assimilate new products and new methods of merchandising. Those who falter, and do not accept these changing conditions, will fall by the wayside. Progress will not be stopped for any great length of time.

Air Conditioning Interests Outsiders

The interest of outsiders in our business was clearly indicated at the International Heating and Ventilating Exposition held early this year in Cleveland. Scores of companies, many of whom not heretofore associated with the Heating and Ventilating industry, exhibited new and intensely interesting Air Conditioning apparatus.

These newcomers will without doubt bring new methods of merchandising, new methods of creating desire on the part of the consumer, and a new class of dealer outlets. **Will our industry be able to withstand this assault? Will we be able to retain the profitable portion of th's new business?**

As I see the picture of the future, there will be two classes of business in our industry. One will hold little or no prospects for profit—the other will call for a considerable expenditure for promotion, but in the final analysis will bring the profits which are so sorely lacking today.

The unprofitable business is that in which too many of us have been engaged in the past—that of volume business with its questionable margin of profit and shifting clientele. It is inconceivable that many of those now engaged in the vain attempt to find volume business that does not exist, and who in addition must combat the flood of distress merchandise being dumped on the market at ridiculous prices, will not some day wake up and find their creditors taking charge of their business.

Air Conditioning Possibilities

The business which I believe holds forth the greater possibilities of profit for our industry is, of course, that of Air Conditioning. This class of business does not have to be sold on a low price basis. The consumer who buys an Air Conditioning system is not interested in the last dollar on the contract price. He wants results, and is willing to pay a good price for them.

Marketing System Revision

Now, I want to mention a few things about our present system of marketing, which I believe will have to be corrected if we are to retain the major portion of this new business. In the past, too little attention has been given to creating a desire for our products from the consumer. Too little attention has been given to how our goods are installed. Too little attention has been given to the maintenance of profit by those who handle our products. Too little attention has been given to the performing qualities of our products in the hands of the consumers.

Changes in our system of distribution are already taking place. Many of our leading manufacturers are now attempting to market their equipment through distributors, or, as some call them, Super-Jobbers. These distributors, or Super-Jobbers, are really service organizations who issue catalogues, travel intelligent salesmen and maintain complete engineering and service organizations.

Probably the most important part of our distribution system is the retail furnace dealer. I believe that he is the weakest link in our marketing chain. I do not wish to infer that the retailer is entirely to blame, because I believe that our entire industry, is pervaded with the same outstanding fault, that of poor merchandising and lack of engineering training.

Selling Costs Too High

Now, the cost of selling our products to the average retailer has heretofore been entirely too high, and with the coming of Air Conditioning, with its various new phases, costs are going to be much higher.

Let's briefly sketch what happens when Mr. Average Consumer indicates he is in the market for a furnace. Mr. Average Retailer, because he has heard that his competitor is making some awful prices, writes to his source of supply to send a salesman at once to help him sell the job. Mr. Salesman rushes fifty or one hundred miles or more (at 4 to 6 cents per mile car expense) and gets on the job just as soon as possible, because he too is anxious to land the job.

Messrs. Dealer and Salesman interview Mr. Prospect, and find that he has been talking to other dealers and salesmen. Mr. Prospect would like to have a detail blue print, as well as an estimate submitted, all of which requires most of the day, or perhaps two days time on the part of the traveling salesman at an expense to the manufacturer or distributor of between $10 and $18 per working day. Perhaps some of you may differ with me on these costs. It has been our experience that the average territorial salesman works less than 250 days per year of actual selling time. If the salesman costs only $3,000 per year for salary and expenses, the cost per day for a 5½ day week would be $12 per day.

It has been our experience during the past year or two that Mr. Consumer will indicate his interest in an Air Conditioning system as well as gravity. He requests a detailed plan from our Engineering Department, which requires the work of an engineer of at least one, and probably two or three days to prepare. These plans and estimates cost real money, more than most of us realize, but no attempt is made to charge this expense to either the dealer or the consumer. It has been our experience that it costs us about $5.00 to blue print and estimate a small gravity job. It costs about $15.00 to engineer and estimate a small air conditioning job. Let's detail these expenses:

Salesman's initial call—One day's time calling on prospect and getting back on regular route.	$12.00
Engineer's time. Gravity and Air Conditioning plan and estimate. Two and one-half day's time	20.00
Second call of salesman—Time..	12.00
	$44.00
If only Gravity job is estimated deduct	15.00
	$29.00

This selling cost is, of course, ridiculously high, and for the furnace manufacturer, who has only a furnace and casing to sell, it is considerable more than his entire gross profit. A distributor of both furnaces and supplies is, of course, in better position to give this service but he, too, finds it expensive.

Suggested Changes

I believe the manufacturer or large distributors must market their product as a complete unit and establish a price for the Air Conditioning unit. This, of course, would not include the cost of pipe, fittings and registers, nor labor. In this retail price should be provided a liberal margin of profit for selling and servicing on the part of the retailer, jobber, distributor and manufacturer. In the retail selling price the manufacturer must also include the cost of a complete merchandising plan.

Second, the manufacturer will have to educate his sales outlets to sell, install and service the equipment.

Third, the present class of smaller dealers will probably act as sub-agents or installers for the district jobber, or retailer, who, as indicated before, will do the actual work of selling, contracting and major servicing.

In this sales plan it will no doubt be necessary to have a time payment plan competitive with other industries.

Profits In Our Business

R. W. Blanchard

IF the matter of profits was not so vital to the development of the industry and if I were a humorist I would dismiss the subject and discourage discussion of it by saying what I know perfectly well you have in mind —there is no such thing and perhaps adding, in our business there has not been anything in the way of profits to write home about for a long time. I know, of course, that all of us have at times made some money, but most of us have averaged little more than the loan value of our invested capital and have received little or nothing for the time and effort contributed, and the responsibilities assumed. This being the case, the matter of profits certainly needs our attention.

Profits Necessary

I expect to add little that is new and startling but rather to earnestly remind you of how necessary profits are if a business is to continue, to develop and to serve its customers as it should. I am not unreasonable enough to believe that during the past year or so we should have been able to accomplish much in the way of profits. The idea I would like to get over is that during the good years we do not as a rule secure enough profit to off-set the lean periods which are bound to come and since history repeats itself and we have better times ahead, we should correct our mistakes of the past. I think this is doubly important just now since it is pretty generally conceded by even those not in the business that warm air heating in its more conventional type and in connection with the more elaborate air conditioning equipment, for which there will be an increasing market, has before it a real opportunity.

You know as well as I the various things which have prevented and destroyed profits in our business. May I remind you of some of them:

Lack of proper cost system.
Desire for volume.
Meeting of competition.
Unnecessary commercial expense.
Ambition to sell everywhere.
Selling mostly cheap goods.
Careless credits.

Notice that the commercial side of our business is largely responsible for our lack of profit.

All of us are not guilty of all of these mistakes but most of us are making some of them.

Cost System Necessary

Take the matter of Cost System. I believe that most companies who have weathered the past year or so have had an adequate Cost System, but some times I wonder if we base our selling prices on our costs.

An ambition to increase the volume of one's business is laudable, but I am wondering if some of us have not done just what other industries have done, namely, figured that volume alone would increase our profits and to secure an increase in sales prices were reduced more than any possible saving from increased production.

None of us like to admit we meet all competition, but some of us do enough of it to turn our possible profits into losses. This practice does destroy profits and the less ambitious we are in that direction probably the more money we will make.

I believe every company represented here today has cleaned house of unnecessary commercial expense and will properly cntrol commercial expenses for a long time to come, either from good judgment or necessity.

We have all tried working the supposedly greener pastures of distant territories and found it was simply the enchantment of distance which made them appear so attractive. Sales effort of that kind eat up and consume a lot of perfectly good profits made in one's so-called normal territory.

To my mind there are two things wrong with selling mostly cheap goods; first, sales will drift more and more from profitable lines until a reputation for low prices is established but from which no money can be made and, second, it is extremely difficult to correct such a situation.

It is hardly necessary to say anything about careless credits. We have all found them expensive, but fortunately we can do considerable to control credits. I do not believe we lose many desirable customers because we are careful with our credits; I know we lose some very undesirable ones.

May I mention some of the advantages of fair profits:

They permit proper development and growth of a business.

They attract capital if needed.

They insure a continued existence of the business.

They make possible better service to customers.

They make business life worth while.

Tests On Gravity Plant With Filters

F. B. Rowley

THE following results were obtained from tests made to determine the operating characteristics of a gravity warm air furnace when using "Dustop" filters in the return air pipe, and to compare the results with those obtained for the same furnace without filters.

For the purpose of making the tests, a No. 827 Waterbury Seamless Furnace was selected. The furnace was set up under a skeleton or frame work in the open laboratory, representing a house of two floors. Each floor was 12 feet square, with 8 feet between floor levels. Four 12-inch leader pipes were taken off from the bonnet for the first floor and four 9-inch leader pipes were taken off for the second floor. Standard single walled leaders and risers were used, with baseboard registers for all inlets. The outlet air was carried to the furnace by three 18-inch diameter return pipes equally spaced around the furnace. Three filter boxes were provided, each of which was equipped with 16-inch by 25-inch standard Dustop filters. The filter boxes were removable from the inlet pipe, and when removed, equivalent lengths of open 18-inch circular pipe were substituted. The furnace was rated as 2.9 square feet area, 60 square feet total heating surface, 52 inches diameter casing, and 725 square inches of leader pipe area. The details of the set-up are shown in the accompanying blue prints and photographs.

Heat was supplied to the furnace by a Roberts Conversion gas burner, using city gas of approximately 550 B. t. u. per cubic foot.

The necessary instruments were provided for determining the total heat input to the furnace, the total air passing through, the temperature rise in the furnace, and the stack gas losses. From these data, the performance characteristics were determined.

A series of tests were run both with and without the filters in the return pipe for the capacities ranging from 60,000 B. t. u. to 160,000 B. t. u. input to the furnace. The results of these tests are shown in the accompanying tabulation.

From an analysis of the test results, it is evident that the installation of filters only negligibly reduces the volume of air passing through the furnace and gives a corresponding increase in the temperature rise of the air. The

combination of the small decrease in volume of air and increase in temperature rise through the furnace when the filters are used gives a capacity at the bonnet slightly less than when the filters are not used, and, also, a slightly lower over-all efficiency at the bonnet.

For the range of tests made, the average drop in efficiency was slightly less than 2 per cent. The average rise in air temperature at the register face with filters was approximately 8°.

The stack gas losses remained the same for tests with and without the filters. It is therefore evident that the difference in efficiency was due to additional losses from the furnace jacket due to the higher temperatures when using the filters. In an average furnace installation, these losses would be used in heating the basement.

WARM AIR FURNACE TEST DATA

1.	Test No.	12	13	14	15	17	18	19	20	21	23	24	26	27
2.	Date	8-12-'32-	8-12-'32	8-18-'32	8-18-'32	9-1-'32	9-1-'32	9-2-'32	9-2-'32	9-3-'32	9-8-'32	9-8-'32	9-20-'32	9-20-'32
3.	Condition for test	No filters	Clean filters	Clean filters	No filters	No filters	Clean filters	Clean filters	No filters	No filters	Clean filters	No filters	No filters	Clean filters
4.	Barometer	29.230	29.230	29.244	29.244	29.234	29.234	29.170	29.170	29.062	29.120	29.120	29.040	29.040
5.	Air temperature, °F.													
	Room	84.8	85.5	73.7	78.8	80.0	83.0	77.6	83.5	78.8	81.1	80.1	67.6	74.2
6.	First floor	88.8	84.0	76.0	81.0	82.6	84.5	78.8	85.5	82.6	84.0	83.2	73.8	79.3
7.	Second floor	91.0	89.0	80.1	84.8	86.3	87.8	81.1	88.2	84.9	87.3	84.5	76.2	81.6
8.	Inlet to furnace	86.1	85.6	72.3	79.1	76.9	79.5	76.4	82.8	78.7	82.1	78.5	67.4	72.9
9.	Bonnet (corrected)	206.1	221.1	182.3	174.1	150.9	166.8	146.4	144.8	187.7	190.1	167.4	176.3	198.3
10.	**Equivalent register: (1st floor)	161.0	165.2	156.9	145.5	126.1	139.9	123.2	111.2	158.3	154.0	143.1	160.8	173.6
11.	**Equivalent register: (2nd floor)	155.1	162.1	149.2	140.4	128.1	133.3	118.0	114.6	152.0	144.3	137.8	153.0	163.9
12.	**Av. equiv. register	158.6	163.4	152.7	143.0	127.1	136.3	120.2	112.9	155.0	148.8	140.5	156.9	168.7
13.	Temperature rise, inlet to bonnet	120.0	135.5	110.0	95.0	74.0	87.3	70.0	62.0	109.0	108.0	89.1	108.9	125.4
14.	Air to furnace inlet, C.F.M. (at inlet temp.)	798.0	661.3	592.0	714.0	657.0	534.0	581.5	562.5	747.3	588.0	696.0	744	621
15.	Air to first floor, C.F.M. (at reg. temp.)	469.7	389.3	333.3	411.9	340.0	280.0	231.0	288.0	440.0	330.0	395.2	448	366.0
16.	Air to second floor, C.F.M. (at reg. temp.)	439.5	433.5	387.4	389.9	344.0	328.0	300.0	303.0	418.0	372.8	378.4	418.0	413.0
17.	Pounds of air per hour, inlet	3,480	2,885	2,648	3,155	2,918	2,360	2,140	2,479	3,308	2,590	3,084	3,360	2,780
18.	Furnace capacity at bonnet, B. t. u. (as tested)	100,990	94,340	70,070	72,440	52,010	49,800	36,050	37,120	87,230	67,590	66,565	88,475	84,210
19.	Gas burned per hour, cu. ft. (meter)	306.7	304.85	230.75	232.95	156.8	156.75	116.35	117.6	282.2	219.5	219.2	288.15	288.95
20.	B. t. u. per cu. ft. of gas (meter)	514.0	515.5	531.9	531.9	522	522	520	516	519	524	521	518	503
21.	B. t. u. per hour to furnace	157,700	157,000	122,700	123,700	81,800	81,800	60,502	60,700	146,300	115,000	114,200	149,262	145,200
22.	Flue gas temperature at furnace collar, °F	687	689	584	588	460.2	458.3	401.5	397.1	645.0	570.3	587.7	660.7	672
23.	CO_2% flue gas	12.6	12.4	9.6	9.7	8.55	8.37	6.34	6.35	10.2	11.15	8.5	10.4	10.3
24.	Draft, inches of water	.003	.002	.003	.004	.003	.003	.001	.001	.003	.003	.004	.004	.004
25.	Stack losses corrected to 10% CO_2 (B. t. u.)	22,300	22,430	14,700	14,550	7,370	7,270	4,650	4,490	19,560	13,090	13,660	21,200	21,380
26.	Capacity at bonnet (corrected to 10% CO_2)	98,430	91,380	70,400	72,698	52,652	50,568	37,448	38,476	87,044	66,870	67,819	88,085	83,862
27.	Efficiency of furnace at bonnet	62.4	58.2	57.4	58.8	64.3	61.7	61.9	63.4	59.5	58.2	59.4	59.0	57.9

**Items 10, 11, and 12: Equivalent register temperature is figured on the basis of 65° inlet air.

ASSOCIATION Activities

The Indiana, Terra Haute District, Meeting

THE District Meeting of the Terre Haute District of the Indiana Association came off as per schedule at the Deming Hotel, Friday, December 9th. A large number of contractors and a fair sprinkling of material men were on hand at 6:30, and after getting acquainted all around, they repaired to the dining room, where turkey and fish were on tap.

District Governor Gus Hartmann turned the meeting over to A. W. Dudley, whose first act as presiding officer was to introduce the "Official Introducer," Harry R. Jones, known to his most intimate friends as "Jonesy." Everyone there was a most intimate friend. "Jonesy" went around the room and introduced every person, giving his name, address and business connection.

Mr. Mehrings, general manager of the Meyer Furnace Co., Peoria, Illinois, was then called on, and made a very interesting talk on air conditioning. He called attention to the fact that there is an immense amount of publicity being given to air conditioning, and that big business is looking on it as the next large development in markets. He urged the necessity of sheet metal contractors getting into the market "while the getting is good."

Mr. Lawrence of the Continental Steel Corporation was next introduced, and talked about steel manufacture. He outlined the processes of steel production, from ore to finished sheet, and called particular attention to the importance of coatings, because it is the coating and not the base sheet that is exposed to corrosive conditions.

Other speakers were called on, and talked briefly. The L. O. S. T. batallion was out in uniform, and were thought by some to be there for no good, but it developed that they were simply advertising the State Convention, which is to come off at the Antler Hotel, Indianapolis, on January 17-18-19, 1933.

Delegations were present from Brazil, Indianapolis, Vincennes and Rockville, besides a good turnout from Terre Haute.

A

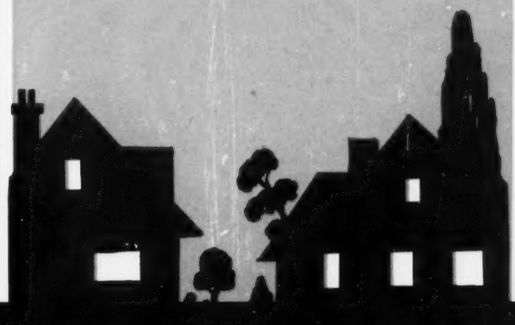
AMERICAN ARTISAN

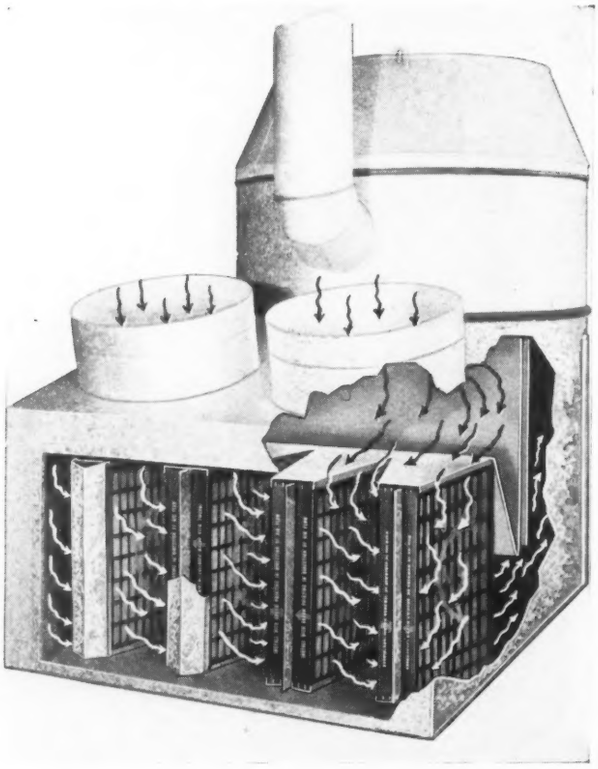
Automatic Heat *and* Air Conditioning Dealer Section

Volume for 1933 is going to come from modernizing, in existing homes. Modernizing, for the present heating plant, means the addition of automatic fueling and of automatic control.

. . . . . Hand in hand with the idea of automatic heating is the idea of air conditioning—of going to the final ideal of comfort in the home where temperature, air motion, humidity and cleanliness are under control.

. . . . . These two things—automatic heating and air conditioning are inseparable and in this section we devote our attention to the selling, designing and installing problems for what is undoubtedly to be a major branch of the building industry.

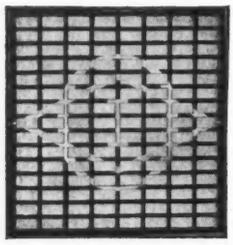




Owens-Illinois combination furnace casing and filter boot equipped with battery of eight "Dustop" filter units.

"DUSTOP" *can help* your warm air Furnace Sales

DUSTOP
Stops Dust



The "Dustop" unit cleans air efficiently at less cost than any other filter on the market.

• With the new Owens-Illinois combination furnace casing and filter boot, a definite selling help has been given to everybody in the warm air furnace business. A battery of our "Dustop" filters has been so arranged in this casing as to permit free passage of air in the return air pipe through the filters and into the furnace. . . Thus the warm air circulated by the heating system is freed of dust and dirt.

The public's great interest in filtered air will make this new development a telling factor in warm air furnace sales. For full particulars write Owens-Illinois Glass Company . . . . Industrial Materials Division, Toledo, Ohio.

OWENS-ILLINOIS

AIR FILTERS

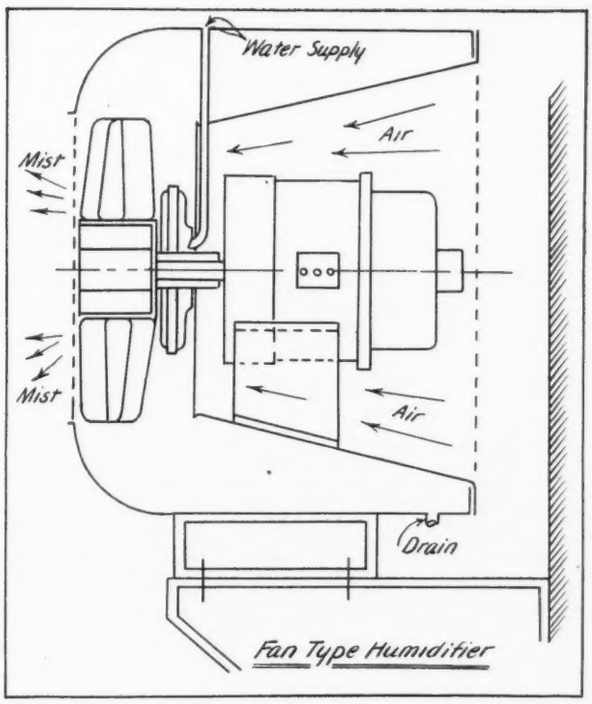


Fig. 1.—One type of humidifier. Water is blown against a disk which flings the water particles from the disk edge into the air

By
Malcolm Tomlinson

In this article Mr. Tomlinson continues his study of humidification, treating of various types of air washers used as humidifiers. He cites the three main factors upon which results will depend: Quantity of water evaporated, the fineness of the spray and the effectiveness of the spray distribution. He shows the degree to which the third factor depends upon the number of nozzles and their arrangement.

Principles of Humidification

THERE are two processes in air conditioning—humidification and dehumidification. The first puts moisture into air-water vapor mixtures. It moistens the air and raises the relative humidity. The second takes moisture out of the air mixture and lowers the relative humidity.

Moisture removal is a more expensive process than humidification. To dry air mixtures usually requires special equipment as will be seen in the discussion that follows. Therefore most air conditioning apparatus is built for humidification solely and is practically helpless to remedy inside weather at high relative humidities. It is, of course, possible to obtain air conditioning equipment which will take care of either one of these processes, or both, as desired.

Some very simple methods of humidification preceded the air washer. One is the pan from which water is evaporated. Its principle disadvantage is that heat sufficient to evaporate the water needed is not always available. A second method is to blow water, in the form of a fine spray, or mist, into the surrounding air mixture. One scheme, shown in Fig. 1, consists of a motor driven disk against which a small stream of water is forced under pressure. The speed of the disk flings the water particles from the disk edge into the air. Surplus water is carried off by a drain. Another scheme makes use of the spray nozzle, shown in Fig. 2, in which the water is forced, under pressure, into the nozzle, given a whirling motion and ejected at high velocity into the air mixture in the form of a mist. Both of these devices find considerable use for industrial humidification but neither method gives a uniform relative humidity.

The air washer not only provides a uniform relative humidity, air motion and air temperature but also removes dust and particles of foreign matter from air mixtures. Air enters these washers by means of a fan and duct system, is cooled by a fine spray of water to the required dew point, is "scrubbed" free of dust and excess moisture by eliminator plates, is heated to the desired temperature and then delivered to the air conditioned space. A typical arrangement for a unit air washer, such as is used for air conditioning the home, is shown in Fig. 3.

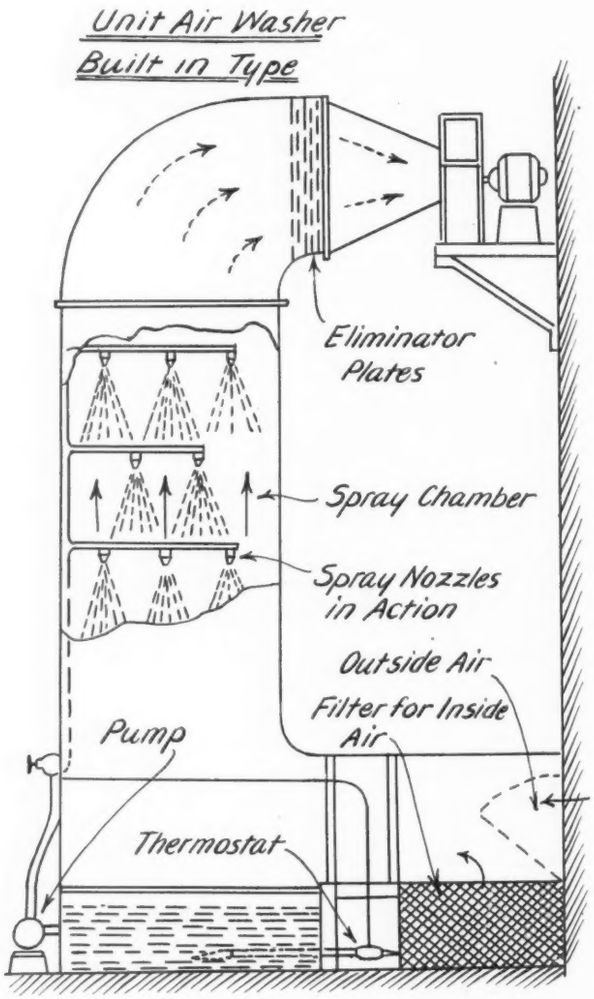
By itself the air washer is not suitable for the removal of smoke, finely divided particles of ash, odors or fumes. This type of service is met by adding an air filter outfit to the air washer unit. Two types of filters are in general use—the dry and the viscous. Dry filters use fine mesh cloth, paper or felt for the

filtering medium. Viscous filters, which are more generally used, depend on some "sticky" fluid, applied to a metal surface, to catch the fine dust particles. At periodic intervals the dirt coated filter units are removed and replaced by clean units. A typical filter assembly is shown in Fig. 4.

The need for clean air is not readily appreciated. All air mixtures contain, at the very least, atmospheric dust. In large cities dust falls at an average rate of from 45 to 130 tons per month per square mile area. Dusts include particles of sand or grit, flue dust, soot, silica dust, cement dust, decayed animal and vegetable matter, bacteria, pollens from plants, tree dusts, fumes and smokes. The very character of these substances is sufficient to indicate, without further discussion, the benefits to be derived from their elimination.

In addition to clean air, ventilation standards of many states require that a definite amount of outside air be mixed with the recirculated inside air. The main purpose of such requirements is to insure a sufficiently rapid removal of harmful gases such as carbon monoxide and carbon dioxide. In addition there is a distinct benefit for human beings in that outside air contains ozone. Nevertheless we must not overlook the fact that outside air, even in the country, is dusty.

Several important events occur in the air washer as indicated previously. The first is the reduction of the incoming air mixture to a predetermined dew point.



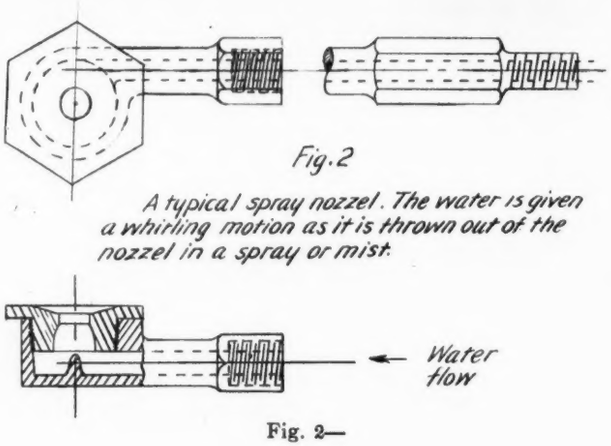


Fig. 2—

Through reference to Fig. 3 in the previous humidification article (December issue) of the AMERICAN ARTISAN you will find how the dew point is located by means of a psychrometric chart and just what the dew point is. At a dry bulb of 70 deg. and a 40 per cent relative humidity the dew point will be 45 deg. Thus we have a picture of the usual average dew point for household humidification. The second is that the wet bulb depression, or the difference between the wet and dry bulb temperatures, furnishes a means by which the efficiency of an air washer can be determined. For the ratio between the depression at the washer outlet and the depression at the washer inlet is always a constant if the air flow is held constant and the total water surface exposed to the air flow is also kept constant. Therefore:

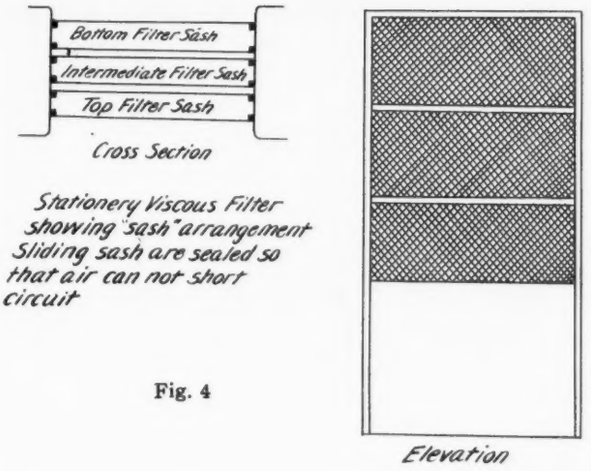
$$\text{Washer efficiency} = \frac{\text{Final wet bulb depression}}{\text{Initial wet bulb depression}}$$

If the final wet bulb depression was 5 deg. and the initial depression was 20 deg. the washer efficiency would equal:

$$1 - \frac{5}{25} = 0.80 \text{ or } 80 \text{ per cent}$$

We can appreciate just what this efficiency means by applying the depressions given to an actual problem. Assume that the air temperature is exactly 70 deg. (just what we desire for comfort) but that the relative humidity is 77 per cent. The wet bulb for this condition would be 65 deg. and the depression exactly 5 deg. To reduce the relative humidity to 40 per cent at 70 deg. dry bulb gives a wet bulb of 45 deg. and a depression of 25 deg. This change in the relative humidity was secured because of the per cent efficiency of the washer. As an efficiency of 70 per cent is considered good for air washers and as some air washers have an efficiency as high as 98 per cent it is evident that washer efficiency plays a large part in humidification results. Also it is obvious that the efficiency of any washer can be checked quickly by the simple pro-

Fig. 3—A typical humidifying washer used for air conditioning in the home



Stationery Viscous Filter showing "sash" arrangement Sliding sash are sealed so that air can not short circuit

Fig. 4

cedure of measuring the wet bulb depression for both the inlet and outlet air.

The results secured by an air washer depend on three main factors: the quantity of water actually evaporated, the fineness of the spray and the effectiveness of the spray distribution. The first of these three factors depends on the pressure of the water, the air velocity through the washer and the water temperature. The second factor is influenced by the rate at which water is sprayed by the spray nozzle and the size, shape and direction of the spray. The third factor depends on the number of nozzles per sq. ft. of cross section through the air washer, the cubical capacity of the spray chamber per spray nozzle and the spacing between the banks of nozzles. A small variation in any one of these numerous factors will affect the efficiency of the washer. A typical spray nozzle is shown in Fig. 2.

An example of the performance of washers is of interest. A one-bank or one-stage commercial, horizontal washer with *parallel* flow of air and water was tested by Massachusetts Institute of Technology. The number of nozzles were varied from 0.785 to 1.57 per sq. ft. of cross section and the water pressure was varied from 3 to 15 lbs. per sq. in. while the rate of water per spray nozzle varied from 3 to 8.5 lbs. per min. per spray nozzle. The latter factor, of course, depended directly on the water pressure. The heat units, in B.T.U. which were transferred from the air to the water spray for evaporation purposes, varied from 0.23 to 2.32 per min. per deg. F. per cu. ft. of spray chamber capacity. In other words the work done by the washer was increased ten times by doubling the number of nozzles and by increasing the water pressure five times. Thus the effect was in direct proportion to the change in the value of the factors mentioned, for 5x2 is 10. The average heat transfer is about 1.5 B.T.U. per min.

Vertical air washers are always slightly more efficient than the horizontal types. Also the rate of air motion which is generally used in air washers varies from about 400 ft. per min. to about 600 ft. per min.

The water used for spray nozzles alone, in gals. per min., usually varies from 0.012 to 0.005 per cubic foot of air handled per minute. In many air washers water is also used to wash, or "flood," the eliminator plates.

In Fig. 5 is shown the minimum temperature to which air can be cooled in an air washer when the humidifying efficiency of the washer is *100 per cent.* As no washer has this efficiency it is necessary to modify, or raise these wet bulb temperatures in proportion to the actual efficiency of the washer with which you are concerned. For example, if the washer efficiency is 90 per cent it is probable that the cooling obtained would be about two degrees above the wet bulbs shown. This wet bulb temperature is that of the air *leaving* the air washer.

We have discussed the problem of humidifying a home for a dry bulb of 70 deg. and a relative humidity of 40 per cent. This condition gives a wet bulb of 56 deg. Reference to Fig. 5 will show that, with an efficiency for the washer of 100 per cent, it would be possible to meet this situation with cold water but that, since such efficiencies are not possible, we can not obtain this degree of cooling in the washer. Since the difference is slight it might be neglected. Otherwise these is a choice of one out of three possibilities. A small refrigerating unit can be applied to cooling the water, ice can be used for the same purpose, or a silica-gel outfit can be supplied to remove part of the water from the incoming high humidity air so that the water can handle the cooling required.

It is now easily possible to check the efficiency of any air washer and also to determine, before hand, whether or not water can be used by itself to obtain the relative humidity sought. With the air cooled to the dew point and wet bulb desired there remains one more function for the air washer before it can deliver the air to the job. A heater must be used to warm the outgoing air to the dry bulb temperature desired. Air washers are provided with gas, oil or steam heated radiators for this particular purpose.

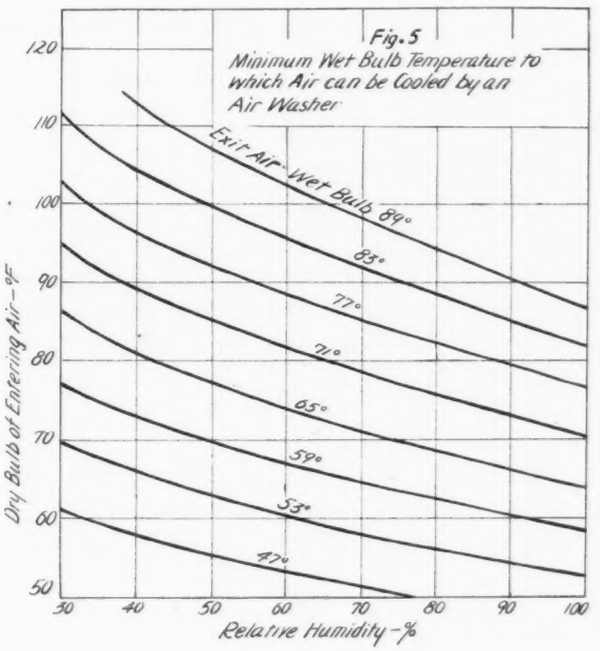


Fig. 5—This chart shows the minimum temperatures which could be secured if a washer were 100 per cent effective

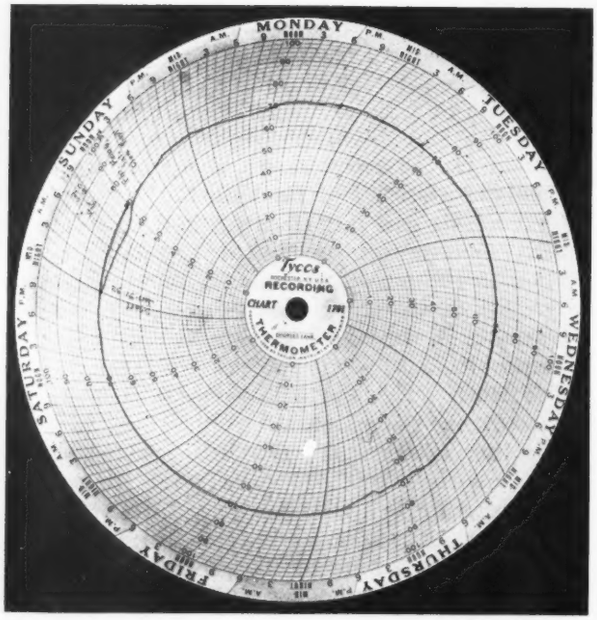


Chart number 1 shows a typical weekly temperature record. Note the uniformity of registration. The recording thermometer was placed a few inches above the floor

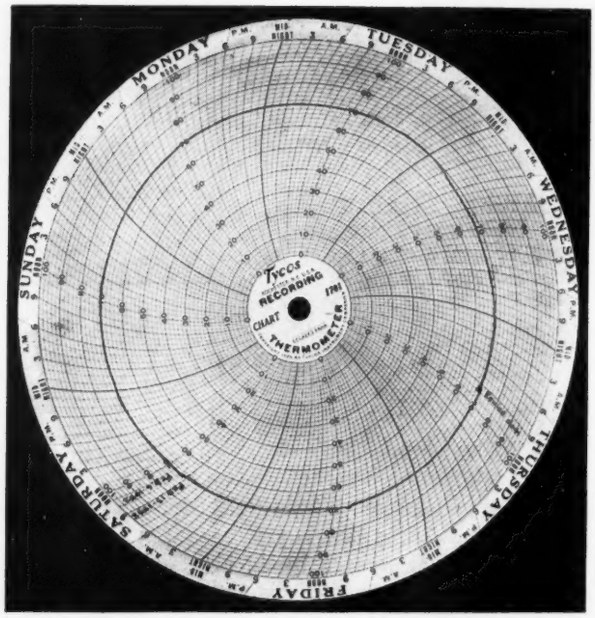


Chart number 2 shows a weekly reading when after midnight Saturday one of the coldest periods occurred. Note the drop to 64 degrees, but read what Mr. Buck says about this period.

Air Conditioning That Warms By Heating The Floors

By Everett S. Buck
Consulting Engineer

Here is a house, described by Mr. Buck as a "tent" and a "sieve," absolutely uninsulated, with no weatherstripping and so loose that curtains wave in the wind. In place of spending money for insulation or stripping when converting to gas heat, Mr. Buck used the design described here. The results are surprising.

LET us suppose you are a heating contractor. Suppose, also, you call upon Mr. and Mrs. Jones this evening and say, "There hasn't been much new building lately so I've been making a survey of homes in the neighborhood. You know, of course, without my telling you, that your old furnace is in pretty bad shape. What would you say if I told you I'd found a way to add a beautiful big social room worth at least $2,000 to your home, to give you a modern thousand dollar air conditioning system that will heat in winter, give comfort in summer, and all automatic, you never have to touch it or think about it.

"All this—$3,000 worth, and it won't cost you a third of that, and you don't need to pay me a dime until you see your basement all cleaned up, and the thing working out as I am telling you."

Now let's stop supposing. Mr. and Mrs. Jones wouldn't believe you. But it's true, and after you showed them it had been done before, convinced them you could do it for them, they'd want it.

Every one wants automatic heating, but the usual plan of selling it fails to strike a responsive chord. There's no romance to it.

This problem of the small house has always interested me. For more than twenty years I've been putting heating systems of one kind and another in them. I fail to see any merit in the proposition of building a thousand dollar room and then filling it up with a cheap system. Nor can I see merit in filling the choicest spots with ugly cast-iron radiators.

The system I put in my own house has enormous possibilities for the Warm Air Industry and is the result of my own research work which was begun in 1921. One cannot fully investigate any subject without reference to historical precedent and this is so in my case.

More than 20 centuries ago the Romans enjoyed a great many luxurious things that later and less civilized generations have never achieved. They built thick walled stone houses which defied the summer sun and

remained cool throughout the hot season. They differed in more than just massive walls from the "heat sieves" and "tents" we moderns have been building since we discovered how thin we could band-saw a log, for they were equipped with *heating systems that warmed the floors.*

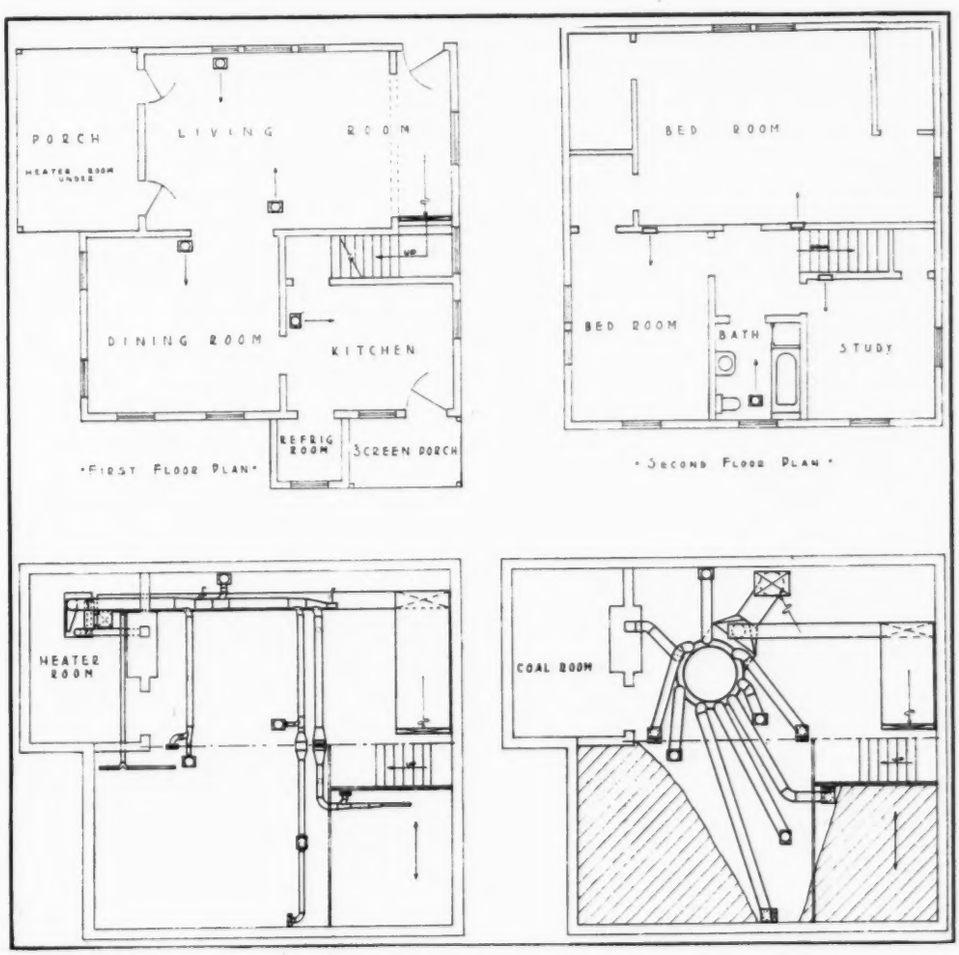
They did it with a series of tile ducts under the floors. These were connected to the furnace, and to a heater pipe leading to the flue or carried up the walls as individual flues, to carry the hot burned gases of combustion, which, diluted with plenty of excess air, became merely warm. How the Roman babies must have loved to play and roll about on those floors!

British heating engineers have made similar installations, called "panel heating" using, generally, hot water pipes concealed in the walls, ceilings, and even in the poured concrete floors. One very obvious result of these panel heating systems is that the presence of this large area of moderate temperature heating surface makes it possible to enjoy the same comfort sensation in air at, say 65 as in air of 75 where floors and walls are cold or cool. (In referring to temperature here I am disregarding the more accurate but less familiar "effective temperature" and quoting ordinary dry bulb recordings which were very carefully taken. The air varied between 25 and 35 per cent relative humidity, dependent on the wind velocity, as windows were leaky and there were no weatherstrips.)

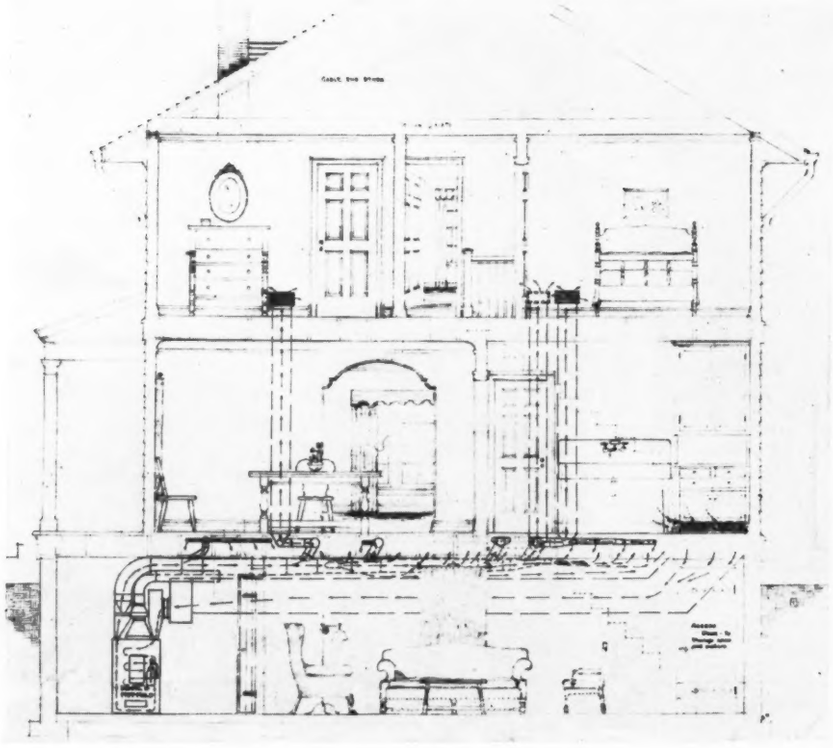
When I came to the job of heating a house for myself I wanted this radiant comfort factor, but I wouldn't put radiators in the choicest spots in my rooms and I wouldn't do without air conditioning. I decided to heat it "a la Rome"—modified to suit quick-burning wood construction. One of the illustrations shows the plan of the old basement as I found it. The shaded areas show the only usable portions, and they were pretty dirty—coal dust, soot, fine ash.

We cleaned out the old coal bin under the porch and the basement as a whole and put one of the fan-operated gas-fired automatic air conditioners in it. We ran the trunk duct through the concrete wall close to the joists and at right angles to their direction, with branches to registers and risers hidden between the joists.

Then we sealed the outer wall ends of the joist spaces, using insulating board and covered the basement ceiling with it, sealing joints with asbestos tape and water-glass. Instead of crossing this *above* the trunk duct we took it *under,* and into the trough thus formed we opened a dampered branch duct. This trough was open to nearly all of those sealed joist spaces, and the rest were reached with small branches of the static



The basement plan (lower left) shows the present heating layout with the stubs which supply the floor plenum. The drawing (lower right) shows the old system. The two plans above show register and grille locations on the first and second floors.



This longitudinal section indicates the risers and the arrangement of first floor plenum. The basement recreation room was made possible by this system

pressure type drilled through the joist centers, a 1-inch round hole in the branch in each joist space.

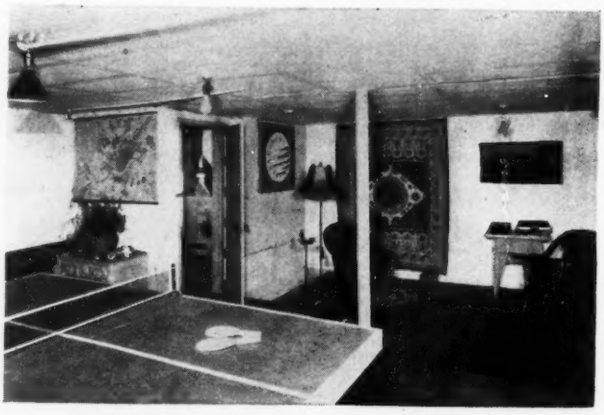
The plan shows how this was done and shows the partition of insulating board which formed one side of the trough, also one side of the recirculating duct for which the bottom of the trough formed a top. Behind this partition which also concealed water, gas, electric meters and panel, we put up storage shelves and hid the window screens and a lot of odds and ends of junk, etc. A sprayed two-coat of white cold water paint completed the basement interior.

It isn't necessary to tell good heating men how much less than a thousand dollars this cost—you can estimate it within a few dollars—but it's worthy of mention that the big social room made available was easily worth $1,500 and would have cost $2,000 to have built onto the first floor even in a rather cheap fashion. Then it would have cost three times as much to heat; would not have been as comfortable in summer. Almost every one who sees it, at once starts replanning his own basement. Get a few of these in for "samples" and you won't need to care if they never build any more new houses.

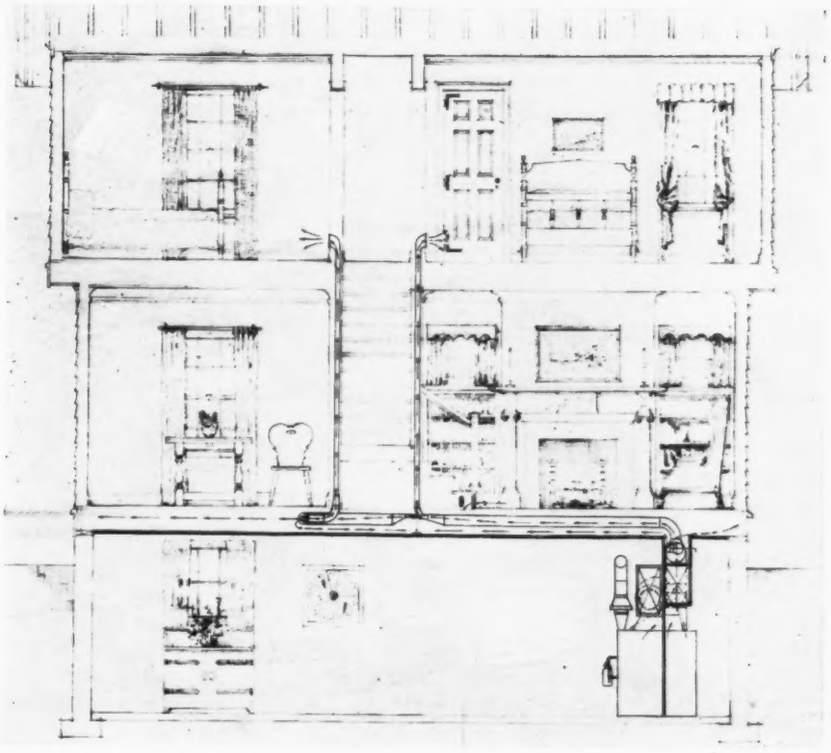
This plan was very carefully studied before it was attempted. I had designed a number of floor-plenum heating jobs before, but in these the air passed under the floor to the outer wall, then into the room through small flush base grilles or through wide grilles under the windows. I didn't want the extra expense of this work, so I depended on the positive pressure of the multiblade blower to put the air in, knowing that the floors, especially at inner partitions, could not possibly be air-tight.

I won't bore you with the technical formulae by which I determined that I could depend upon getting one-third of my heat into the room by this method, and by which I reassured myself that there would be no damage to the hardwood floors. Suffice to say, you may go ahead on that basis confidently and warm the floors wherever you get the chance. Anything you get in the way of results will be that much better than cold floors. You have a great design advantage compared with the use of indirect steam heating surface, in that you can regulate the temperature of the air entering the floor plenum to anything desired *after* the job is installed by merely changing the combustion rate and the air quantity, whereas the 212 F. of atmospheric steam is pretty likely to give you air too low in temperature and if you reduce the air flow to raise the air temperature, the total heat will probably be insufficient. Before I ever did any of these floor heating jobs where there was merely a rough and a finished wood floor, I talked about it to literally dozens of architects, engineers, builders, flooring "experts"—and the guesses on the thing varied from a belief that the floor would catch fire, all the way to the opposite belief that there would be swelling of the wood because of the use of the humidifier. The consensus was that it shouldn't be done.

As a matter of fact, exactly nothing visible hap-



When the work was completed this attractive basement room was secured by placing the heater in a corner and finishing off the walls and ceiling



The cross section indicates partition use for risers and the extension of the first floor plenum to the outside walls. Ducts are carried behind the basement ceiling

pened, and a little inspection and comparison of figures will make this fairly evident. I was using air that varied around 180° F. Except immediately at the duct mouth, the highest air temperature between the joists was 130°. You know you get a very rapid mixing and heat is lost to the colder floor very quickly. The total moisture content of the air was not as high as it is on a humid summer day, but that is nowhere near as dry as the cold air of winter, so the average condition was simply an improvement over the usual winter condition, and a general approximation of average summer conditions.

Directly above this warmest point, a thermometer bulb laid on the living room rug read as high as 90° and the ankle height temperature there was 72°, while at the same time the general air temperature was 70° at the breathing line. The mixture at the first stair riser recirculation grille was about 69° and I located my thermostat behind this, setting the recording thermometer where it got this mixture.

That is the way Chart No. 1 was made, and you don't need to apologize for temperature control like that, rather, in the idiom, "try to get it." For comparison, take some simultaneous readings on any job next really cold day. If your inner wall thermostat thermometer reads 70° you're pretty likely to find an ankle height temperature of 63°, assuredly you will near the outer wall of an uninsulated house. That is why nearly every one sets these high wall stats to 75° and shoves them higher on a really cold day.

Comparative fuel costs do not mean very much, even where you have carefully figured the heat loss, except that you may use them as a guide to satisfy yourself that you are on the right track. This becomes more evident by inspection of the heat loss figures of this particular house, but I am going to make a comparison and let you evaluate it in your own terms.

The basement heat loss with the air infiltration carefully determined as just under one change hourly, amounted to 550 B. t. u. per deg. per hr. It was supplied with just enough air to keep it at 58° to 60° except when we used the social room; then we kept it at 70° to 73° while in use, which was most of Saturday and Sunday and two or three evenings weekly.

The first and second floor heat logs computed with one air change hourly amounted to 83,600 B.t.u. at zero —70° and of this total one air change amounts to only 16½%, whereas in a well-insulated, cubical type house with the usual glass area, one air change may be 35% of the total heat loss. Most houses will, during the heating season, average one air change per hour by natural infiltration and a real open window crank will get four times that much, say ten times as much as he could possibly have any use for, so you can see why you should refuse to give fuel guarantees with an automatic system. If the windows are left open, the automatic goes right on working, and can easily burn 100% more fuel than your estimate.

This "tent" of mine certainly had more than one air change an hour when a breath of wind was stirring. No insulation, loosely built, no weather strips, and an unusual glass area—all helped to make it much more than that. With a stiff west wind blowing, the curtains swung freely and a newspaper on the living room floor

Small round pipe were used for warm air leaders. This is the basement billiard room before the walls and ceilings were finished

in front of those French doors would turn its own pages. But I wasn't interested in immediate correction of these things; I wanted to see what it would cost to heat such a sieve and just how well it could be done. No need to say that it couldn't be done with a really strong west wind, but under any other condition, that warm floor certainly proved to be the answer.

A neighbor heating engineer with a slightly smaller house, much better built, had a four-year record of coal, coke and oil, all well fired and under the control of a good automatic regulator. Coal had cost him $78, which would be $90 by ratio for my house. Gas is cheap in Cincinnati, for we are close to the field; the rate for 875,000 B.t.u. starting at 75 cents and decreasing 5 cents each 5,000 cubic feet until 50 cents is reached. In the whole year 1931 with 4,420 degree days, I used just $108 worth of heating gas and I kept the temperature day and night just like that No. 1 chart.

The surprising feature of this semi-radiant system is still to be told. In January, 1932, I saw that we were not likely to get any below zero weather to severely test the system, so I deliberately limited the heat input to 63,000 B.t.u. per hour. The object of this was to make the unit run for longer periods and keep the floor as warm as possible.

Now look at Chart No. 2, made with the recorder as before. The outdoor temperature had dropped quickly to 14° and hung there all night. During that steady drop from 70° to 66° I sat reading and trying for distant stations on the radio, clad in light pajamas and without slippers. When the west coast stations quit coming in I retired, and next morning found a further reduction to 64°. Clad as before, I sat above that warm living room floor in perfect comfort, reading the Sunday paper. The floor surface still read 90°, but the ankle height dropped to 70° and a thermometer on a knee-high coffee table near me read 64°, the same as the general return air temperature at the recording instrument.

What about the fuel saving here? Well, since heat loss is directly proportional to temperature difference indoor and outdoor, I was maintaining perfect comfort with the ratio (70°-14°) : (64°-14°) : : 1 :893, or with .893 of the normal fuel requirement.

I was, of course, anxious to see how far this might be carried on, but the only opportunity I had was an outdoor temperature of 8° and this was coincident with a stiff west wind, which dropped that ankle height temperature to 68° and the general air temperature to 60°. I was not comfortable then, when clad as before, but my family, clad normally, said it was warm enough. You know there's been quite a bit of discussion lately about the A. S. of H. & V. Eng. Comfort Chart for persons "normally clad." My own idea has been that the house isn't comfortable unless you can lounge about in pajamas.

If I had installed a little 2 H. P. refrigeration compressor I could have cooled this entire house this summer. As it was, my fan was too small, for the coldest air available during August and September was basement air at 76.° That may not sound very cool, but it is exactly 19 degrees cooler than the second floor bedrooms of my house at 6 p. m. after a sunny summer day, for they were usually 95° then. I would start the fan with all the air concentrated into two bedrooms with deflectors in the low-wall registers to throw this breeze directly over the beds. By 11 p. m. I never had more than 5 degrees room temperature reduction even though the outdoors dropped to 80°, as the heat-retaining power of walls, etc., kept the room warm, but with that fairly cool and gentle breeze over the bed, I could sleep comfortably enough if not perfectly. Without the fan those rooms were unbearable.

Now if and when the refrigeration manufacturers make good on their promises of a small low-cost unit, it can be connected to this air delivery system, the windowns can be weather-stripped, the second floor ceiling insulated, and the occupant of that house can truly "make his own climate."

Our Cover Illustration

THE illustration used on this month's cover shows a downtown display in the gas company corner window in Rockford, Ill. The display was prepared by Leigh R. Mutimer, one of Rockford's progressive heating contractors.

Mr. Mutimer has been installing forced air and conditioning systems for approximately three years. At the time the photograph was taken, this display had been in the window for two and one-half months. During that period four sales directly traceable to the display were closed. In addition, a considerable number of passers-by had stopped to inquire about the system shown and to request additional information, particularly prices and recommendations on how the auxiliary system might be applied to their particular heating plants.

The display was developed by Mr. Mutimer and officials of the gas company. The space was donated by the gas company free of charge, the only expense assumed by the contractor being the time necessary to assemble the equipment. The system shows a Fox furnace and a Niagara auxiliary gas furnace of small size.

The furnace and the gas auxiliary are attractively painted and are flooded by overhead lights after dark. The prominence of the corner and the good taste of the general display speaks well for the advertising acumen of the gas company and Mr. Mutimer.

Jobs and Prospects Developed by Spokane Exhibit

WITH air conditioning and automatic heating in its infancy as far as the territory of Spokane, Washington, is concerned, and with installations in this district far below that of an average city of similar size, some months ago the Spokane Automatic Heating, Air Conditioning, and Insulation Bureau was formed. Its purpose obviously was promotion work—its members the interested dealers.

As the Bureau began to function, a survey of the field pointed to education of the buying public along air conditioning lines as the first great need to be met.

An air conditioning show was suggested, to be staged cooperatively by the dealers. A pioneer among such events, there was much speculation as to the outcome of such a show among the dealers and much inertia to be overcome before it was agreed to put it on.

It was held successfully, however, August 29 to September 3, with all the dealers expressing general satisfaction with the results, although a few offered suggestions as to how a wider appeal may be made for the event in the future, for it seems inevitable that the show will be repeated, perhaps annually.

In a year of stress, such as this, no one wanted an exhibition which would end with a deficit, so it was determined, and the plan adhered to, that cash sufficient to care for all expenses must be on hand before the show opened. Also the dealer firms contributing wished to speculate on the undertaking with only a modest budget, with the result that the small amount of advertising permitted was designed to attract that group of people which would be really interested in automatic heating and air conditioning, and not to make, as a greater amount of publicity could have done, a wide popular appeal.

Newspapers and the radio were made the basis of the advertising campaign, with the radio time that could be bought being greatly increased by the time donated by interested firms running regular features on the air. In addition, cards of invitation were printed, each firm taking as many as it wished, to bear the name of such representatives as it desired. These cards read:

The Board of Directors of
THE AUTOMATIC HEATING, AIR CONDITIONING, and INSULATION BUREAU
Cordially Invites You to Attend
SPOKANE'S FIRST
AIR CONDITIONING SHOW
Courtesy of.....

The exhibition was open every day from 12 noon to 10 p. m., free to the public, of course. Assisted by G. C. Breidert, general sales manager of the Ilg Electric Ventilating company of Chicago, who was in Spokane to help with the staging of the event, the committee in charge decided that as the exhibition was aimed to be entirely educational no exhibitor should give away prizes on the floor, no sales should be consummated on the floor, and, to allow for greater attractiveness to the visitor and fairness to the dealers,

(Continued on page 44)

Zipperian displays oil burners in show windows that rival those of any specialty organization

C. G. Zipperian, Sheet Metal Contractor,

Builds Business With Oil Burners

ENDEAVORING to build his heating sales to greater volume and offset decreased general sheet metal work, C. G. Zipperian, Sea Cliff, N. Y., for many years a prominent sheet metal contractor, adopted vacuum cleaning of heating plants and signed a contract to merchandise oil burners. Both immediately found response and developed steadily.

Private estates, local homes and stores for many years have been the backbone and sinew of this contractor's customer and prospect lists. He has flashed, guttered, roofed and leadered hundreds of the buildings in his territory. Yet, recent years have not brought an increase in his general business, so Mr. Zipperian turned to appliances as the method to offset reductions in his established lines of activity. He has not been disappointed.

One outstanding factor impressed this sheet metal contractor from the beginning of his heating appliance selling. He found he could not wait for customers to come to him uninvited. He had to make personal calls, send out form letters, advertise in the daily newspapers. These things have been and now are being done. And in advertising oil burners and furnace cleaning all other branches of the sheet metal business have increased at the same time. The oil burner end was separated by Zipperian by forming a sales company in which his name does not appear.

The important factor in selling, sensed Zipperian, is to gain the acquaintance and confidence of home owners. This he effected more thoroughly by branching out. Having finished approximately 200 cleaning jobs during the past summer the contractor made at least 100 new friends, the remainder being old customers and already on the books.

Taking the cleaning customers as a nucleus, Zipperian soon approached all who did not already have oil burners. More than 20 oil burner sales were made to them. Appliance orders started to come in as the prospect list grew. Soon two salesmen were employed on a strictly commission basis.

Each salesman had a few dozen friends and relatives to whom several sales were made. As time went on the satisfied oil burner list swelled and these folk have been sending Zipperian the bulk of his new leads. With this contractor an oil burner lead never grows cold. He or his men keep in constant touch with prospects until it is evident that sales cannot be made. Not until then are the names crossed off the list.

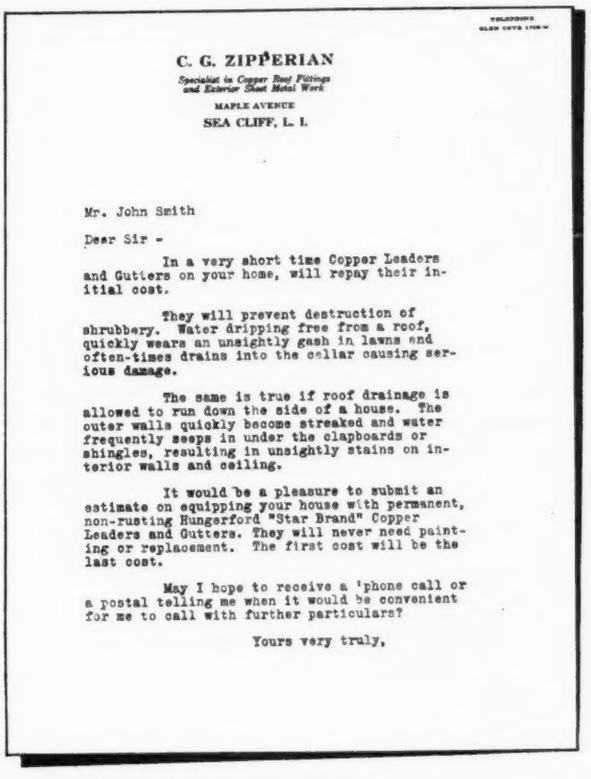
An important factor in connection with oil burner and heater cleaning was found to be the huge volume of repair work turned up. Before installing oil burners, Zipperian is sure that results will be satisfactory. Unless this is true orders are turned down. In some 75 per cent of the heating plants examined prior to installing burners or noted in cleaning, remodeling proved necessary. When the systems were of steam or hot water type the plumbing contractor next door was called in, otherwise this warm air contractor handled the trouble himself.

The proximity of the plumber makes it simple for both contractors to help each other. The plumber gives the warm air man many leads on both furnace work and oil burners, while the sheet metal contractor hands over considerable work to his neighbor.

How Prospects Are Found

Zipperian's outside salesmen exhaust every resource to ferret out likely oil burner customers. They call on real estate dealers, filling station employees, building contractors, carpenters, acquaintances. When leads are received from these sources commissions of 5 per cent are given to the contributors in the event of sale. Should the spasmodic co-operators make sales themselves without assistance the rewards are much larger. The dealer makes a point of never allowing assistance to go unrewarded.

Oil burners for kitchen ranges prove another profitable item. Many residents in his territory are beyond the gas main network and have been burning coal from lack of other fuel that demands less attention. Sheet metal contractor Zipperian and his men point out the advantages of oil. In the aggregate the number of prospects for this type of burner equal in number central heating prospects.



C. G. ZIPPERIAN
Specialist in Copper Roof Fittings and Exterior Sheet Metal Work
MAPLE AVENUE
SEA CLIFF, L. I.

Mr. John Smith

Dear Sir -

In a very short time Copper Leaders and Gutters on your home, will repay their initial cost.

They will prevent destruction of shrubbery. Water dripping free from a roof, quickly wears an unsightly gash in lawns and often-times drains into the cellar causing serious damage.

The same is true if roof drainage is allowed to run down the side of a house. The outer walls quickly become streaked and water frequently seeps in under the clapboards or shingles, resulting in unsightly stains on interior walls and ceiling.

It would be a pleasure to submit an estimate on equipping your house with permanent, non-rusting Hungerford "Star Brand" Copper Leaders and Gutters. They will never need painting or replacement. The first cost will be the last cost.

May I hope to receive a 'phone call or a postal telling me when it would be convenient for me to call with further particulars?

Yours very truly,

Form letters play an important part in the sales program of this contractor. This letter, used to solicit drainage repairs, brought sheet metal business and also gave Mr. Zipperian an opportunity to list the owner as a prospect for additional services

Another appliance sold by the contractor is portable humidifiers. The model handled is electrically operated and circulates air along with its moisture discharge. Mr. Zipperian feels in selling these that he is paving the way for air conditioning, which he will go into more extensively in 1933. Just now he is establishing himself as a dealer in conditioning.

The Zipperian Organization

General sheet metal work of manifold varieties long has been the mainstay of the Sea Cliff man's business. He has not diminished his efforts in this direction. Howard I. Zipperian, a son, at present is a student at Carnegie Institute of Technology where he is taking a sheet metal course of study. The younger man has contributed much by way of new selling ideas.

For instance, one feature is a comparative heating cost chart which proves useful in selling oil burners. In this the comparative costs of heating by hand-fired coal and by oil burners are contrasted so plainly that operating cost objections quickly are broken down.

The son also prepared a survey sheet whereon canvassers who are not certain of the correct size of oil burner to recommend can jot down the heating plant facts found on inspection for checking by Mr. Zipperian. He also had several photographs taken of outstanding installations for use in talking with prospects. So satisfactory has the appliance department grown that these are looked to as the foundation of future activities of the contractor.

Newspaper advertisements and handbills are also used. This copy was used in the local newspaper during a furnace cleaning campaign

Spokane Show

(Continued from page 41)

no two pieces of equipment of the same nature should be shown in adjoining stalls.

With no definite count made, the attendance was satisfactory, it being apparent that the visitors were drawn from the class which it was aimed to reach by the advertising—those interested in air conditioning—not those attracted to a show by curiosity or the hope

of prizes and samples. A survey made several days after the close of the exhibit showed one firm pleased with six very live prospects, another with 8, another with 3, another with 12. One gave as the results to them, 20 prospects, another 3 jobs; another firm reported the sale of 10,000 feet of its insulating product.

EXHIBITORS

EXHIBITORS	PRODUCTS EXHIBITED
Wm. Lucas Plumbing and Heating Co.	Frigidaire Air-Conditioning
Zono Products Co.	The Iron Fireman—Stoker
R. H. Peck Plumbing and Heating Co.	Zonolite Insulation
Exchange Lumber Co.	A. B. C. Oil Burner
Standard Plumbing and Heating Co.	Insolex (insulation)
Hughes and Co.	Paramount Oil Burner—Lang Furnace
Elec. Group	Sunbeam Conditioning Furnace
	Ventilating fans of all sizes
	Attic fans and kitchen fans.
Graybar Electric Co.	Klenzair—room humidifier
H. C. DeLong Co.	Hart Oil Burner
	Shawmut Range Burner
Wheeler Sheet Metal Co.	Round Oak Furnace—Washer
Johnson-Bungay Fuel Co.	Fairbanks Morse—Stoker
	Stokermatic—Stoker
	Electrol Oil Burner
Tull and Gibbs	
Spokane Paper & Stationary Co.	Themax—insulation
Magnesite Products Co.	Magnesite insulation
Baird-Naundorf Lumber Co.	
Building Supplies, Inc.	
Heating Assurance, Inc.	Nelson Stoker and Air Washer
Diamond Ice and Fuel Co.	Chil Aire—Iced room cooler
	Coals and Oil
Jas. Smyth Plumbing and Heating	Williams Oil-Matic Burner
	Sirocco Unit Air-Conditioning
	Frigidaire—Unit Air-Conditioning

AMERICAN ARTISAN
Automatic Heat and Air Conditioning Dealer Section

Let us introduce to you

AIR CONDITIONING FOR COMFORT

This Brand New Book Gives Sales Points — Complete Engineering Data — and a Reliable Background for Your Knowledge of Air Conditioning

AIR CONDITIONING FOR COMFORT is brand new—the first complete book to give the "whys, hows and what withs" of engineering for conditioned air. It is written in concise, clear language that ably answers the flood of questions being asked about this big subject.

Its 256 pages are alive with the tables, diagrams and essential data which an engineer or contractor must have to properly estimate or design a job, be it skyscraper or cottage. They set forth the practical formulas for computing all the components of the various heating, cooling and de-humidifying systems.

Samuel R. Lewis, who wrote the book, is a pioneer in the development of the design of plants cooling for comfort, is past president of the American Society of Heating and Ventilating Engineers, and is a consulting engineer with an impressive record of large and small heating and cooling installations to his credit. Out of these achievements has come the exhaustive knowledge and qualifying experience which makes Mr. Lewis such an admirable choice to write this authoritative book on AIR CONDITIONING FOR COMFORT.

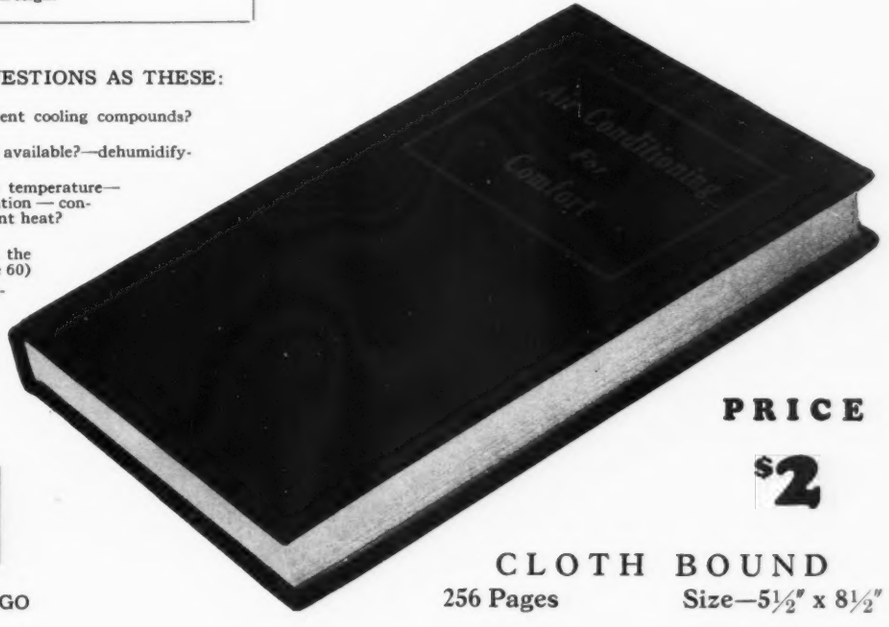
You have the opportunity at last of completely informing yourself on the merits of the various air conditioning systems. Send us $2.00 and AIR CONDITIONING FOR COMFORT will be mailed you promptly—with this additional promise—that if you do not want to keep it, you may return it within ten days and we will refund your money.

CONTENTS OF AIR CONDITIONING FOR COMFORT

36 Tables, 94 Figures, Charts and Diagrams in This New Book, of Which the Following Are Examples:

ANSWERS SCORES OF SUCH QUESTIONS AS THESE:

—What are the strong points of the different cooling compounds? (See page 26)
—What are the different humidifying devices available?—dehumidifying devices? (See page 8)
—What is relation of the human body to temperature—moisture — motion — chemicals — radiation — convection—evaporation—sensible and latent heat? (See page 42)
—What cooling system will work best with the various heating installations? (See page 60)
—How do you calculate air conditioning requirements? (See chapter 6)
—What is the reasonable temperature and humidity for satisfactory artificial cooling of living quarters? (See table 2)



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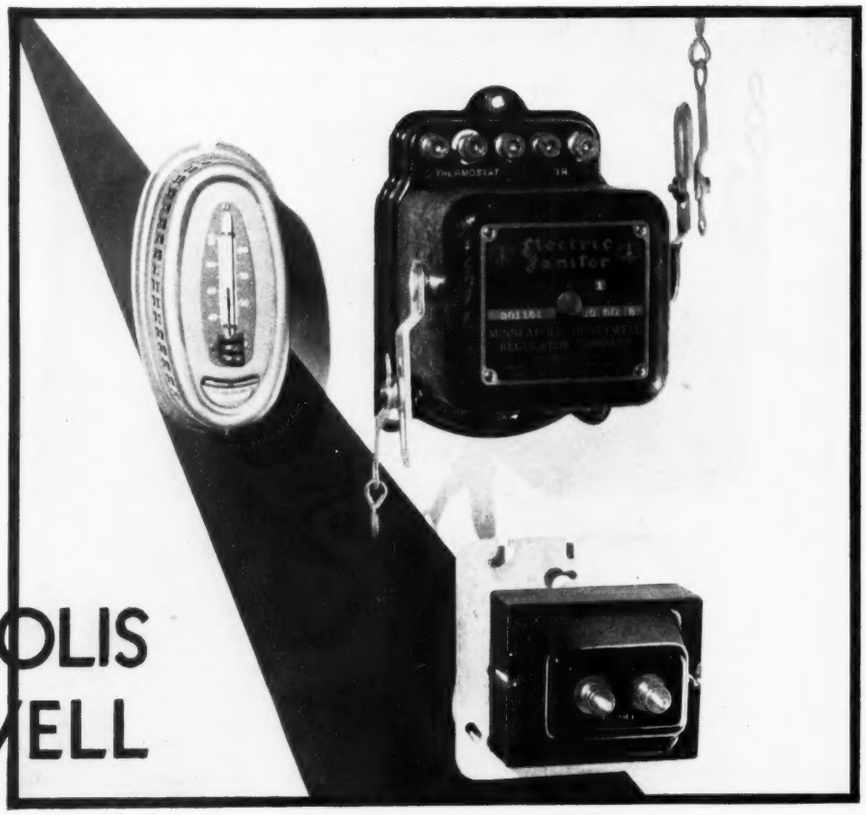


The New Electric Janitor is packed complete with motor, thermostat, external low voltage transformer and all necessary fittings. Thermostat operates on change of 2° F. or less. Con-Tac-Tor Mercury Switch assures positive action. Brushless induction motor requires no lubrication at any time. Equipped with basement switch for closing dampers when stoking.

MINNEAPOLIS HONEYWELL

Presents the

NEW AND IMPROVED

Electric Janitor

HERE it is—the new and improved Electric Janitor—a low priced damper regulator that you can recommend and sell with confidence. Priced at only $20.90 to the trade, the Electric Janitor is built to Minneapolis-Honeywell standards and quality. The low cost of this entirely electric control for all domestic coal fired heating plants makes every home, no matter how modest, a prospect, as it pays for itself over and over again in fuel savings, comfort, convenience and health.

The Electric Janitor has features ordinarily found only in more expensive regulators. It is Minneapolis-Honeywell through and through, is sturdy, simple and compact, easy to install, and once installed requires no service.

The Electric Janitor will sell itself on merit. Remember the quality, remember the price, and remember the name. Minneapolis-Honeywell Regulator Company, 2726 Fourth Avenue South, Minneapolis, Minnesota.

DEALER PRICE

$20.90 NET

ORDER THRU YOUR JOBBER

MINNEAPOLIS-HONEYWELL

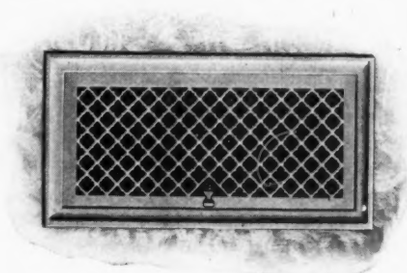
Control Systems

New PRODUCTS

Register Moulding

A new moulding for use with Hart and Cooley sidewall registers is announced. This moulding, No. 3900 Art Moulding, is for use with registers which are set flush with the plaster. The purpose of the moulding is to conceal the fine joint between the frame and the plaster.

The moulding is available in any size and may be used with the company's three-piece flush type register. The moulding is entirely separate and overlaps the frame a full ⅛-inch. It is held in place by the same screws which hold the face and may be installed with the face or later.



Complete information is published on sheet 361 which can be obtained from the company.

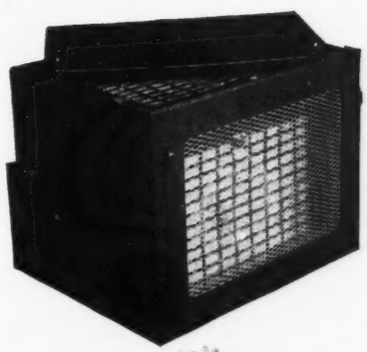
◆

Peerless Duplex Blower

A furnace blower unit having 800 square inches of filter area and a maximum capacity of 1,200 cubic feet of air per minute at ⅛ inch static pressure, sufficient for the average five to seven room home, is announced by the Peerless Electric Company of Warren, Ohio. Among the features are a control box which permits the selection of any one of seven speeds to provide the proper air capacity for each installation.

The blower has interchangeable top and rear panels. Thus air may be taken in from either surface. No cold air return duct is necessary for efficient operation. If a cold air return duct is required by the local heating code, the grilled panel is not used, and the solid panel is placed on the rear of the cabinet, the cold air ducts being brought to the open top of the cabinet.

Another feature of the interchangeable panel and grill is its adaptability for summer use. Basement air may be taken into the blower and circulated throughout the house. If a cold air return duct is used, the grilled panel may be substituted for the solid panel at rear of cabinet for summer use, thus uniting the cooled and vitalized basement air with the returned air.



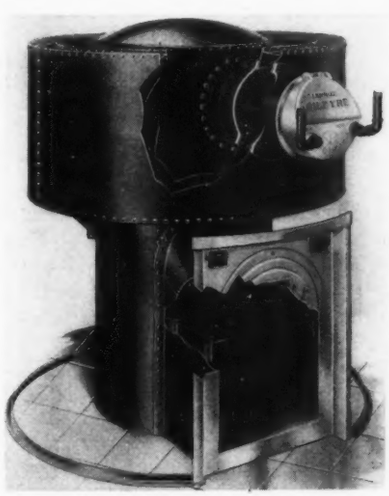
The blower wheels are mounted on the double extended motor shaft—eliminating the use of a driving belt. The unit is powered by a Peerless capacitor type spring mounted motor.

There is no by-pass damper on the blower. The blower may be used with special controller for selective two speed, twenty-four hour continuous operation.

◆

Lennox Oilfyre

A new steel furnace, especially designed for oil burner application, to be marketed under the trade name Oilfyre is announced by the Lennox Furnace Co., Marshalltown, Iowa.



The furnace is made from heavy boiler plate steel with all seams hot riveted and cold caulked. A large cylindrical radiator completely encircles the combustion drum and provides a long fire travel. The hot gases enter the radiator at the front and travel two ways to the smoke outlet at the rear. The radiator is smooth, high and narrow.

Hot water supply is by a coil introduced through the cleanout door at the front. The front casting is unusually low and is so designed that either a gun type or rotary burner may be used.

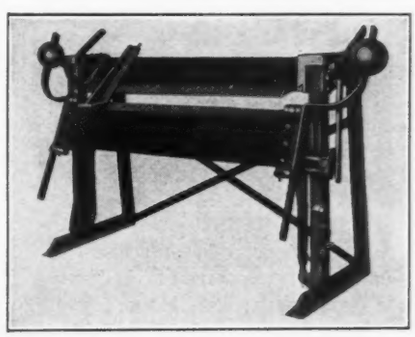
A new leaflet showing and describing the furnace has been prepared and will be mailed to contractors writing the company.

◆

Whitney Metal Brake

Whitney Metal Tool Co., Rockford, Ill., announces a new metal brake which has been under construction for more than a year but is now completed and being used in the constructing of the new post office at Rockford.

The outstanding features of the brake are, it operates just the reverse from any other machine of its kind. The platen which holds the work or rather the part which the material is held against is stationary or solid, enabling the brake to make very square corners. The lower portion or clamping rail and bending apron slides on the two end post.



Two coil springs balance the weight of the lower mechanism so the man is relieved of doing any lifting.

The second feature is the fact it is

a dual machine, as in ten or fifteen minutes it can be converted into a box or pan brake as well as a bending brake. A box finger at one end of the machine provides fastenings for fingers to the platen to make any desired pan or box within the limit of the machine.

The machine is 90 per cent steel and is sturdily made to take care of all thicknesses up to and including 16 gauge. All fitting parts are machined and interchangeable.

◆

Rudy Enters Low Priced Field

Rudy Furnace Company, Dowagiac, Mich., has announced a new warm air furnace, known as the "200" series, to sell in the low priced bracket. Designed as a coal-fired furnace, the new series may be adapted either to oil-firing or gas-firing.

Although the company's announcement of the new line started to the trade Nov. 1, orders received in the first 10 days of November showed an

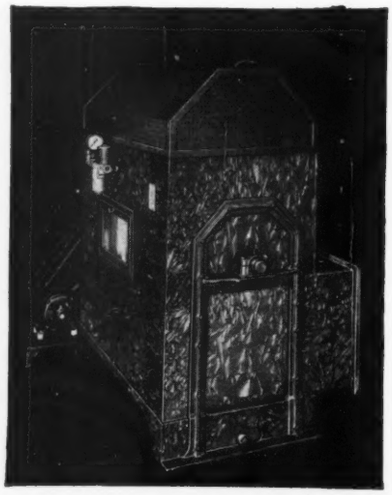
increase of 20 per cent during the final 10 days of October, a contra-seasonal trend normally.

Charles J. Biek, general manager of the company, states that stocks of furnaces in the company's hands, warehouses and in dealers' hands on Nov. 1, were the lowest in 17 years. Continuation of improvement in demand as a result of the new line will necessitate the stepping up of foundry and factory operations, he said.

"While we have placed a price on the new furnace line comparable with that on lines marketed 17 years ago by us, we have in no way cheapened our product," Mr. Biek said, "the '200' series might be called a 'thrift' model in that the new series has been stripped of some features carried by the Standard Rudy series. The workmanship and quality of materials going into the '200' series is constant with the standard series."

Premier Conditioners Now Crackle Finished

The Premier Warm Air Heater Company, Dowagiac, Michigan, announce a new green crackle finish now standard on Premier Washed Air Conditioners at no increase in price.



The new finish represents a new departure. By means of a patented and recently developed process, crackles or fans are caused to form in the enamel, producing a striking and highly attractive effect particularly when the unit is displayed in contrasting light and shadow. Besides being more attractive, it is claimed that the new finish will not chip, flake or scratch as easily as brittle baked enamels. New copper bearing sheets also have been adopted for all sheet metal parts of the unit. A cast iron base or drain pan and a cadmium plated blower further increase resistance to rust and corrosion.

In announcing the new finish, mention is made that the Premier Air Conditioning Department has operated 6 days a week all through this year, indicating the demand for a complete and proven unit of the type they manufacture.

◆

Standardized Radiator Enclosures

A new line of standardized parts for radiator enclosures is announced by the Harrington and King Perforating Co., 5655 Fillmore St.. Chicago.

This line of sections can be bought for any size enclosure and assembled by the contractor. All parts are fabricated for assembly and are sold at prices which make it possible to resell to the home owner at lower prices than required for special cabinets.

Complete information will be given by the company upon request.

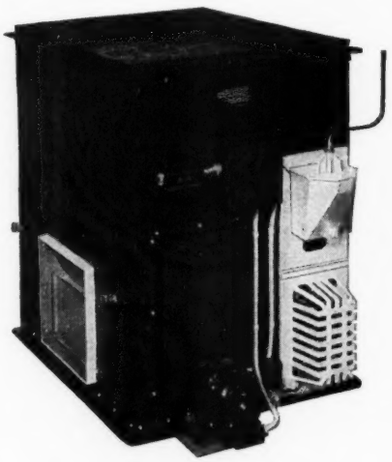
Conditioning Unit With Controlled Humidification

The Columbus Air Conditioner has just been announced by the Columbus Humidifier Company of Columbus, Ohio. In addition to forced circulation and filtration, the outstanding feature of the unit is controlled humidification.

Vapor is produced by forced evaporation by a gas burner supplying heat through a Model "C" Columbus Humidifier under control of a Humidistat. If gas is not available, an electric heating element can be furnished. It is stated the Columbus Air Conditioner will produce and hold the relative humidity within 2 per cent minus or plus or the tolerance of the humidistat. The humidity is produced in such a gradual manner as to avoid excessive moisture "dumping." The evaporation is definitely governed by the humidistat.

The evaporating capacity has a range of from nothing to 30 gallons per 24 hours, the moisture output taking place only as and when the residence calls for it to be brought up to the percentage the humidistat has been set for.

Some of the outstanding features of the Columbus Unit are: heavy rigid construction, quiet operation, sound insulation, conservative ratings, effective cleaning with removable filters, low power consumption, repulsion induction brush lifting type motor, a



special relay of their own design having a 2 volt control line to the humidistat, no sewer connections, no waste of water and no transformers to hum. The width of the unit permits going through a 29 inch door. Black baked crinkle finish.

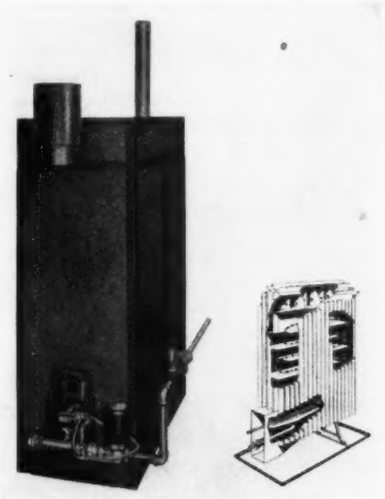
The Columbus Air Conditioner will be sold through qualified dealers in air conditioning, heating and ventilating work, and such dealers are invited to write for an illustrated circular and full data.

New Gas Furnace

A new gas furnace incorporating a number of new features of design is announced by the Waterman-Waterbury Company, Minneapolis.

The furnace is of the steel type with the combustion section formed in fluted, pressed steel formations giving vertical and smooth air travel up the heating surface. The inside of the chamber contains several staggered horizontal baffles causing increased heat travel.

Humidity is provided by the usual



Waterbury dome pan mounted directly on the combustion chamber.

The furnace will be made in six sizes, ranging from 70,000 to 420,000 B.t.u. input rating.

Literature describing the furnace has been prepared and will be mailed upon request to the company.

◆

Air Conditioning Unit

A new unit air conditioner designed for application to warm air furnaces is announced by the Liberty Foundry Co., St. Louis, Mo.

The unit consists of a slow speed blower, low priced filters, and a humidifying element using sprays and controls all housed vertically in a cabinet ready for connection with the furnace. The humidifier is set for 45 per cent at the factory. Bearings are of the outboard type, with ball socket and bronze bushings.

The conditioner will be furnished in two sizes—a Junior for three to six room houses and the Senior for larger residences. Air capacity of the Junior is 500-1500 C. F. M. and the Senior 1000-3000 C. F. M., both against ⅛ inch static pressure.

Complete details and prices may be obtained from the company.

Leader Filter

A new filter intended to be installed in warm air pipes will be offered shortly under the trade name Filtaire. It will come ready for installation on warm air pipes, and will be supplied

with standard collars to fit the various pipe sizes. The filter itself is mounted on a slide so that it may be easily removed for cleaning and then replaced. The Filtaire is manufactured by the Filtaire Corporation, 111 W. Bruce St., Milwaukee, Wisconsin.

◆

Conditioning Units

An improved and extended line of air conditioning units is announced for 1933 by Lau Heating Service, Inc., Dayton, Ohio.

The 1933 line includes furnace blowers ranging from 500 to 5,000 C.F.M. in single and double wheel assemblies, with or without drives or motors, booster blowers specified 500 to 4,200 C.F.M. against ⅛-inch static resistance, filter cabinets for any of the popular types of filter sections, air washers designed for one of the lines of blowers.

The company also announces a new type of cushion drive which eliminates all mechanical noise.

Complete data on the units has been secured and assembled and will be supplied upon request to the company.

◆

Revolving Ventilator

A revolving ventilator designed to improve the draft on all types of stacks is announced by the Accurate Mfg. Co., 2432 Milwaukee Ave., Chicago.

The ventilator gives full revolving action since the head is mounted on a weather-proof bearing. The head is one piece formed in copper alloy metal and shaped like a helmet with the wind director at the top. Convenient fastening holes are provided in the steel base so that the ventilator can be secured to any shape or type of chimney. Sizes range from 6-inch to 48-inch.

Complete information is contained in a leaflet which the company will mail upon request.

◆

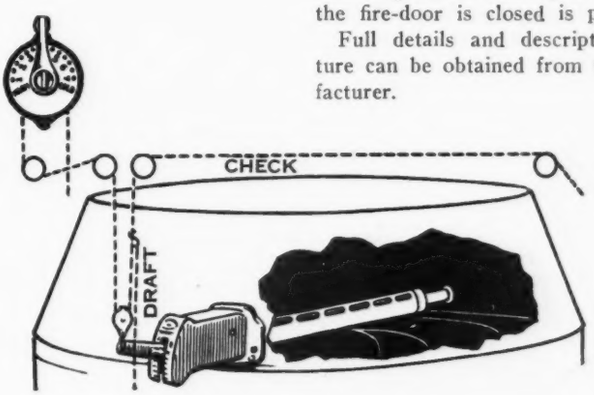
Mechanical Automatic Control

A direct automatic control for draft and check doors operating mechanically by expansion and contraction and designed for application to any warm air furnace is announced by the Thomas Long Co., Inc., 624 Leland Ave., South Bend, Ind.

The control has been under experimental manufacture and use for several months. In construction the control consists primarily of a tube having a high coefficient of expansion anchored to the metal housing. Inside this expanding tube is a rod having a low coefficient of expansion anchored to the tube at one end and to the operating lever at the other. The operating lever is anchored to the rod and to the housing, forming the fulcrum on which it works. Thus the draft and check dampers are controlled by the alternating expansion and contraction of the tube in the bonnet of the furnace.

The control is simply and rigidly constructed. The control operates so gradually there is no wear and tear on any of the moving parts. There is only one operating lever. The control is made of non-rustable materials. By a simple arrangement, the added convenience of having the draft and check dampers automatically close when the fire-door is opened and automatically resuming their former positions when the fire-door is closed is provided.

Full details and descriptive literature can be obtained from the manufacturer.



News Items . . . . . .

Indiana Convention Program

The Convention of the Sheet Metal & Warm Air Heating Contractors' Association of Indiana will be held January 17, 18, 19, 1933, at the Antlers Hotel in Indianapolis. Following the custom established some years back, the Convention will combine an informative program with an interesting exhibit, so that the contractors of the State may both see and hear about the latest developments in mechanics, and in practical application of the best information available.

The Convention will climax a year of unusual activity on the part of the Indiana Association. During 1932, District Meetings were held at Fort Wayne, Lafayette, Indianapolis, New Castle, Evansville and Terre Haute. These meetings were surprisingly well attended and were replete with information, entertainment, good will and sociability. They continue in a very effective manner the work of the Association in cementing good will and cooperation among all of the elements of the sheet metal and furnace trade.

"Pop" Voorhees, the grand old man of Indiana, who is president of the Association, has always been the leading spirit in the building of Convention programs. He has formulated for the coming Convention a program well designed to cover the points which both sheet metal and furnace contractors find of great importance, and which are not satisfactorily covered at any other time. Mr. Voorhees has planned several talks of a practical nature by men of foresight and enthusiasm who are capable of instilling optimism and stimulating activity in their auditors.

Included on the program will be a talk on instruments, particularly the anemometer, a talk on air conditioning along the line of its practical features, a talk on steel, particularly base sheets, a talk on sales possibilities and future of air conditioning and a talk on protective coatings for steel sheets. In addition to this there will be talks on business getting methods, and on various problems of shop management.

◆

Follansbee Buys Mill

Follansbee Brothers Company of Pittsburgh has purchased from the Cold Metal Process Company a cold-strip drawing mill for installation in its plant at Follansbee, W. Va.

The mill, which will be completed within twelve weeks in the equipment plants of Cold Metal Process Company at Youngstown, O., and the Baldwin-Southwark Company, a Baldwin Locomotive Works subsidiary at Philadelphia, should be in place by February.

The Follansbee Company has taken a license authorizing it to purchase ten additional cold-strip mills and one hot-strip mill at a future expenditure of nearly $2,000,000. The 38-inch mill in process of construction, as described above, will cost $200,000, approximately.

◆

Broaden Lines in Standardized Home Equipment

Additional items of Monel Metal domestic service equipment in standardized sizes and models are listed in a new catalogue published by The International Nickel Company.

Included is an 82-inch double drainboard, two compartment sink. This sink is modelled after the "Straitline" sinks previously announced with the exception that it has the additional compartment. Other items are cabinet tops in an assorted variety of shapes and sizes of equipment as well as equipment previously announced.

Announce Line of Rock Wool Insulations

Announcement is made of a new line of rock wool insulating products made by the Standard Lime and Stone Company (Capitol Rock Wool Insulation Div.).

Distribution of the products will be under the supervision of Frank C. Russell, who will be remembered as the former president of the Mineral Felt Insulating Company, Toledo, Ohio. He has long been identified with the rock wool insulating industry and has contributed many of the basic inventions which promoted the use of fabricated rock wool as insulation against heat and cold.

The Standard Lime and Stone Company, with its affiliated companies, has been prominent in the building trades since 1888. Chief among its many products are Capitol X Portland Cement, and Washington Lime Products.

Under Mr. Russell's supervision, two newly equipped plants at Millville, W. Va., will manufacture a complete line of insulations for both domestic and industrial use. The home offices of both the Standard Lime and Stone Company and of the Capitol Rock Wool Insulation Division are located in Baltimore, where Mr. Russell will also have his headquarters.

◆

To Manufacture Metal Products

Schriber Sheet Metal & Roofers, Inc., Dayton, Ohio, has been organized by H. H. Durst and I. L. Jacobson, 1005 Third National Building, to manufacture sheet metal products.

◆

Cooling and Air Conditioning Corp.

The Cooling and Air Conditioning Corp., founded by and until recently, partly owned by the B. F. Sturtevant Company, is now a completely owned Sturtevant subsidiary, to be incorporated under the laws of Massachusetts. The name of the corporation will be changed to Sturtevant-Cooling and Air Conditioning Company, with its headquarters at Hyde Park, Boston, Mass.

Sturtevant-Cooling and Air Conditioning Company will continue to handle public building conditioning and comfort work, also process work of the system type, applicable to industries. The company will operate under a broad patent coverage.

The B. F. Sturtevant Company will handle, through the regular trade channels, the manufacturing and sale of the unit type of air conditioning product, such as coolers, humidifiers, or combinations of both.

◆

New Ceiling Firm

Paramount Metal Ceiling Co., Inc., New York, has been organized by Adolph Pitar, 2801 East Seventh Street, Brooklyn, and James Hart, 200 Broome Street, New York, to manufacture metal ceilings and kindred sheet metal products.

◆

Anchor Fence Post Changes

The Anchor Post Fence Company, 6500 Eastern Ave., Baltimore, manufacturer of the Fluid Heat Oil Burner, announces that Donald G. Day has joined its sales force. Mr. Day has been assigned to the New England territory, with headquarters at the company's branch office in Boston.

The company also announces the appointment of Captain Frederick Schauss as manager of the Fluid Heat Factory Branch in Baltimore.

Several new dealers for the company's oil burners have been appointed throughout New York, New Jersey and Connecticut.

News Items . . . . . .

Armco Buys Erie Steel

Properties of the Lake Erie Steel and Blanking Company, Cleveland, Ohio, have been acquired by The American Rolling Mill Company, of Middletown, Ohio.

Lake Erie Steel is engaged in the jobbing of sheets, and specializes in selling sheared blanks for press shop requirements. M. S. Phillips has been made president and general manager of the company. He has been assistant to the general manager of sales for The American Rolling Mill Company where he has had wide experience both in operations and sales work.

◆

A. G. Brauer Offers Sign

An attractive blue and white metal sign which can be displayed in the dealer's window or in the show room is offered by the A. G. Brauer Supply Co., 316 North Third St., St. Louis. The sign will be given free with an order and can be obtained without an order by sending twenty cents to cover mailing costs.

The sign is some 9 by 13 inches in size—large enough to attract attention in the window or store.

◆

Rudy November Shipments Up

Rudy Furnace Co. shipped five per cent more furnaces in November than in October and 10 per cent more than in November, 1931, Charles J. Biek, general manager, announced recently.

Although November normally shows a seasonal decline from October, Mr. Biek stated that stimulus furnished sales by introduction of the "200 series" low priced furnace Nov. 1 has reversed the usual trend.

Shipments in the final 10 days of November were 56 per cent larger than in the second 10 day period. The second 10 day shipments were 47 per cent larger than in the first 10 days of the month.

◆

Charles P. Forshew Dies

Charles P. Forshew, vice-president and treasurer of the Faultless Heater Corporation of Cleveland, Ohio, died suddenly of heart failure on December 22, at his home in Cleveland.

Mr. Forshew had for the past twenty-three years been associated with the Graff Furnace Company of Scranton, Pennsylvania, and was president at the time the business was dissolved last year. He was also vice-president of the Faultless Range and Manufacturing Company of New York City.

His funeral was held on December 23, at Hudson, N. Y. Mr. Forshew is survived by his wife, Geraldine Wright Forshew, his daughter Barbara, and two sons, Robert Pierpont and John Hildreth.

New Literature . . . .

Catalogue of Metal Working Machines and Tools

A comprehensive catalogue composed of previously published bulletins has been prepared in loose leaf form by the Niagara Machine and Tool Works, 637 Northland Ave., Buffalo, N. Y. In the new catalogue are bulletins on folders, brakes, rotary machines, groovers, seamers, slip roll formers, hand tools, lever shears and punches and squaring and rotary shears.

Each bulletin contains complete descriptions of the machines together with explanation of the operation and use. Full illustrations of all machine and tool design features are covered by photograph and text.

A copy of this catalogue can be obtained from the company.

◆

"Electro Sheet" Booklet

The American Brass Company, Waterbury, Conn., has ready for mailing a new booklet describing the company's thin gauge copper sheets. Samples of one, two and three ounce sheets are clipped into the booklet so that contractors can feel the weight, flexibility and texture of these thin sheets.

According to the booklet these sheets are made by the electro depositing process. Sheets are available in weights of from one to eight ounces per square foot and in widths of 30 to 50 inches. Lengths are practically limitless.

The text lists some of the most important uses of this new type of sheet.

◆

Switch and Control Catalogues

The Penn Electric Switch Co., Des Moines, Iowa, have prepared three catalogues showing their lines of switches and controls for domestic and commercial refrigeration, oil burners, unit heaters, heating equipment, and pumping equipment.

The catalogues are arranged to incorporate installations of similar nature within each booklet. Each unit is covered fully by illustration and explanatory matter giving all installation, design, construction and operating characteristics.

Each catalogue is assembled in heavy covers and identified by A. I. A. file numbers for use as reference books.

Copies of the catalogues can be obtained from the company.

◆

Repair Parts Catalogue

The Cincinnati Stamping Co., 28 West McMiken Ave., Cincinnati, has recently published a repair parts catalogue covering boiler and furnace parts. This catalogue, known as Price List No. 120, contains some 70 pages filled with itemized listings of all the parts the company is in a position to supply. Prices are also shown.

Heating contractors doing repair work can get a copy by writing the company.

New Literature . . . .

New Conversion Burner Leaflet

A new conversion type gas burner suitable for installation in any warm air furnace or boiler is described in a colored four-page leaflet recently issued by the Kelsey Heating Company, Syracuse, N. Y.

The leaflet describes the new burner and shows construction details. The leaflet is designed for use as a consumer mailing piece with space on the front cover for a letter to the prospect. Following pages explain the advantages of gas heat and list advantages to be anticipated. Space is also given to the Kelsey "ConditionAire" heating system.

Copies of this literature can be secured from the company.

◆

Soldering and Brazing Leaflet

Prest-O-Lite Torches is a new, illustrated booklet published by The Linde Air Products Company, New York.

This publication has material of interest to electricians, sheet metal mechanics, plumbers, mechanical refrigerator men, telephone linemen, garages, dentists, and to all others who are interested in economical and efficient soldering, brazing and heating equipment. It contains descriptions and illustrations of the complete range of Prest-O-Lite equipment for soldering, brazing and heating requirements. The range of applications and types of work for which Prest-O-Lite equipment is especially convenient and efficient are described in detail. This equipment operates on Prest-O-Lite Gas (dissolved acetylene) which is available in tanks containing 70, 40, 30 or 10 cu. ft., at thousands of conveniently located exchange stations throughout the country.

◆

Facts About Galvanized Sheets

The American Zinc Institute has prepared a small booklet, "Facts About Heavy Coated Galvanized Sheets," which will be mailed to contractors wishing a copy. The Institute address is 60 East 42nd St., New York.

The purpose of the booklet is to set forth in understandable language the many applications of galvanized sheets, to explain how sheets are covered and how this covering governs the life of the sheet. The text also tells about the Institute's investigation on weathering and sets out in tables the comparison between weight of zinc coating and the sheet's serviceability.

◆

Letter to the Trade

Republic Metals, Inc., Chicago, Ill., during November mailed a post-election letter to some 8,000 accounts. This letter listed eight reasons why business pickup may be anticipated. These reasons are: Manufactured stocks are down too low, retail stocks are at the minimum, no profit is being made, capital is filtering back into trade, labor is slowly returning to work, individual needs are increasing daily, business men are looking for the turn and planning accordingly.

BUYERS' GUIDE

AIR CLEANERS

American Air Filter Co., Inc., Louisville, Ky.
Kleenaire Filter Co., Stevens Point, Wis.
Lakeside Co., Hermansville, Mich.
Owens-Illinois Glass Co., Toledo, Ohio

AIR CONDITIONERS
(See Unit Air Conditioners)

AIR WASHERS

Gehrl & Co., Inc., A., Tacoma, Wash.
Hess Warming & Vent. Co., Chicago, Ill.
Lakeside Co., Hermansville, Mich.
Meyer Furnace Co., The, Peoria, Illinois.

BLAST GATES

Berger Bros. Co., Philadelphia, Pa.

BLOWERS

Gehrl & Co., Inc., A., Tacoma, Wash.
Hess Warming & Vent. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Lakeside Co., Hermansville, Mich.
Meyer Furnace Co., The, Peoria, Illinois.
Peerless Electric Co., Warren, Ohio

BRAKES—BENDING

Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.

BRAKES—CORNICE

Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.

BRASS AND COPPER

American Brass Co., Waterbury, Conn.
Revere Copper and Brass, Inc., Rome, N. Y.

CASING RINGS—FURNACE

Forest City Foundries Co., Cleveland, Ohio.
Peerless Foundry Co., Inc., Indianapolis, Ind.

CASTINGS—MALLEABLE

Berger Bros. Co., Philadelphia, Pa.

CEILINGS—METAL

Berger Mfg. Division of Truscon Steel Co., Canton, Ohio
Canton Steel Ceiling Co., Canton, Ohio
Globe Iron Roofing and Corrugating Company, Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

CEMENT—FURNACE

Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

CHAIN—FURNACE

Hart & Cooley Mfg. Co., Chicago, Ill.
Russell Mfg. Co., Inc., The John M., Naugatuck, Conn.

CLEANERS—FURNACE VACUUM

Breuer Elec. Mfg. Co., Chicago, Ill.
National Super Service Co., Toledo, Ohio
Ramey Mfg. Co., The, Columbus, Ohio.

CONDUCTOR ELBOWS AND SHOES

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Osborn Co., The J. M. & L. A., Detroit Cleveland, Buffalo

CONDUCTOR FITTINGS

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

CONDUCTOR PIPE

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

CONTROLS, FURNACE

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Peerless Electric Co., Warren, Ohio

COPPER

American Brass Co., Waterbury, Conn.
Brown Wales Co., Boston, Mass.
Revere Copper & Brass, Inc., Rome, N. Y.

CORNICES

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

CRIMPING MACHINES

Bertsch & Company, Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

CUT-OFFS—RAIN WATER

Barnes Metal Products Co., Chicago, Ill.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

DAMPERS—QUADRANTS—ACCESSORIES

Aeolus Dickinson, Chicago, Ill.
Hart & Cooley Mfg. Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Parker-Kalon Corp., New York, N. Y.
Young Ventilating Co., Cleveland, Ohio

DIFFUSERS—AIR DUCT

Aeolus Dickinson, Chicago, Ill.

DRIVE SCREWS—HARDENED METALLIC

Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York

EAVES TROUGH

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co. Cincinnati, Ohio
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

EAVES TROUGH HANGERS

Barnes Metal Products Co., Chicago, Ill
Berger Bros. Co., Philadelphia, Pa.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City

FANS, DRAFT

Vacu-Draft Corp., Muncie, Ind.

FANS—FURNACE

A-C Mfg. Company, Pontiac, Illinois
Gehrl & Co., Inc., A., Tacoma, Wash.
Roan Mfg. Co., Racine, Wis
Peerless Electric Co., Warren, Ohio

BUYERS' GUIDE

FILTERS—AIR

American Air Filter Co., Inc., Louisville, Ky.
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FILTERS—FURNACE

American Air Filter Co., Inc., Louisville, Ky.
Gehri & Co., Inc., A., Tacoma, Wash.
Kleenaire Filter Co., Stevens Point, Wis.
Lakeside Co., Hermansville, Mich.
Owens-Illinois Glass Co., Toledo, Ohio

FLUXES—SOLDERING

Kester Solder Company, Chicago, Ill.

FORMING ROLLS

Bertsch & Company, Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

FURNACE CLEANERS

(See Cleaners—Furnace Vacuum)

FURNACES FOR GAS OR OIL

Henry Furnace & Foundry Co., Cleveland, Ohio.

FURNACES—GAS

Forest City Foundries Co., Cleveland, Ohio
Henry Furnace & Foundry Co., Cleveland, Ohio
Lennox Furnace Co., Marshalltown, Iowa
Meyer Furnace Company, Peoria, Ill.
Payne Furnace and Supply Co., Beverly Hills, Calif.

FURNACES—GAS AUXILIARY

Forest City Foundries Co., Cleveland, Ohio

FURNACES, GAS SOLDERING

Interstate Machinery Co., Chicago.

FURNACES—OIL BURNING

Meyer Furnace Co., The, Peoria, Illinois.
Motor Wheel Corp., Heater Div., Lansing, Mich.
Peerless Foundry Co., Indianapolis, Ind.

FURNACES—WARM AIR

(See Also Unit Air Conditioners)

Agricola Furnace Co., Gadsden, Ala.
Andes Range & Furnace Corp., Geneva, N. Y.
Deshler Foundry & Machine Works, Deshler, Ohio
Dowagiac Steel Furnace Co., Dowagiac, Mich.
Forest City Foundries Co., Cleveland, Ohio
Fox Furnace Co., The, Elyria, Ohio.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Hess Warming & Vent. Co., Chicago, Ill.
Lennox Furnace Co., Marshalltown, Iowa
May-Fiebeger Co., The, Newark, Ohio.
Meyer Furnace Co., The, Peoria, Illinois
Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Payne Furnace & Supply Co., Beverly Hills, Calif.
Peerless Foundry Co., Indianapolis, Ind.

GRILLES

Harrington & King Perforating Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Chicago, Ill.
Independent Register & Mfg. Co., Cleveland, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Rock Island Register Co., Rock Island, Ill.

GUARDS—MACHINE AND BELT

Harrington & King Perforating Co., Chicago, Ill.

HANDLES—BOILER

Berger Bros. Co., Philadelphia, Pa.

HANDLES—SOLDERING IRON

Parker-Kalon Corp., New York, N. Y.

HEATERS—CABINET

Agricola Furnace Co., Gadsden, Ala.
Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Payne Furnace & Supply Co., Beverly Hills, Calif.

HEATERS—GAS CABINET

Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Payne Furnace & Supply Co., Beverly Hills, Calif.

HEATERS—SCHOOL ROOM

May-Fiebeger Co., The, Newark, Ohio.
Meyer Furnace Company, The, Peoria, Ill.
Peerless Foundry Co., Indianapolis, Ind.

HUMIDIFIERS

Clarm Mechanical Devices Co., Lima, Ohio
Columbus Humidifier Co., Columbus, Ohio.
Hess Warming & Vent. Co., Chicago, Ill.
Lakeside Co., Hermansville, Mich.
Meyer & Bro. Company, F., Peoria, Ill.
Sallada Mfg. Co., Minneapolis, Minn.
Wisconsin Humidifier Sales Co., Milwaukee, Wisconsin.

MACHINERY—CULVERT

Bertsch & Co., Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

MACHINERY—REBUILT AND USED

Interstate Machinery Co., Chicago, Ill.

MACHINES AND TOOLS—SHEET METAL WORKING

Bertsch & Company, Cambridge City, Ind.
Brown Wales Co., Boston, Mass.
Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Iowa.
Parker-Kalon Corp., New York, N. Y.
Viking Shear Co., Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill.

METAL LATH—EXPANDED

Barnes Metal Products Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo.

MITERS

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo.

NAILS—HARDENED MASONRY

Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.

PERFORATED METALS

Harrington & King Perforating Co., Chicago, Ill.

PIPE AND FITTINGS—FURNACE

Dieckmann Co., The Ferdinand, Cincinnati, Ohio
Henry Furnace & Fdy. Co., Cleveland, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Peerless Foundry Co., Indianapolis, Ind.

POKERS—FURNACE

Henry Furnace & Foundry Co., Cleveland, Ohio.
Independent Reg. & Mfg. Co., Cleveland, Ohio.

BUYERS' GUIDE

PRESSES
Dries & Krump Mfg. Co., Chicago, Ill.

PULLEYS—FURNACE
Hart & Cooley Mfg. Co., Chicago, Ill.

PUNCHES
Bertsch & Co., Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

PUNCHES—COMBINATION BENCH AND HAND
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.

PUNCHES—HAND
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

RADIATOR CABINETS
Hart & Cooley Mfg. Co., Chicago, Ill.
Meyer & Bro. Co., F., Peoria, Ill.
Revere Copper & Brass, Inc., New York City.

REGISTERS
Forest City Foundries Co., Cleveland, Ohio.
Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio.
Independent Register & Mfg. Co., Cleveland, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Peerless Foundry Co., Indianapolis, Ind.

REGISTERS—WOOD
Auer Register Co., Cleveland, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

REGULATORS AND LOCKS, VOLUME DAMPER
Young Ventilating Co., The, Cleveland, O.

REGULATORS—AUTOMATIC HEAT
Cook Electric Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
White Mfg. Co., St. Paul, Minn.

REGULATORS—DAMPER
Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

REGULATORS, DRAFT, AUTOMATIC
Vacu Draft Corp., Muncie, Ind.

REPAIRS—STOVE AND FURNACE
Brauer Supply Co., A. G., St. Louis, Mo.
National Foundry & Furnace Co., Dayton, Ohio.
Peerless Foundry Co., Indianapolis, Ind.

RIDGING
Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

RINGS—FURNACE CASING
Forest City Foundries Co., Cleveland, Ohio.

ROOF FLASHING
Barnes Metal Products Co., Chicago, Ill.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

ROOFING—IRON AND STEEL
American Rolling Mill Co., Middletown, Ohio.
Barnes Metal Products Co., Chicago, Ill.
Brown Wales Co., Boston, Mass.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Inland Steel Company, Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., The, Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

ROOFING—TIN AND TERNE
Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

RUBBISH BURNERS
Hart & Cooley Mfg. Co., Chicago, Ill.

SCREWS—HARDENED METALLIC DRIVE
Interstate Machinery Co., Chicago, Ill.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Parker-Kalon Corp., New York City.

SCREWS—HARDENED SELF TAPPING SHEET METAL
Interstate Machinery Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Parker-Kalon Corp., New York City.

SCREENS—PERFORATED METAL
Harrington & King Perforating Co., Chicago, Ill.

SCUPPERS
Aeolus Dickinson, Chicago, Ill.

SHEARS—HAND AND POWER
Dries & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Iowa.
Stanley Electric Tool Co., New Britain, Conn.
Viking Shear Company, Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill

SHEET METAL SCREWS—HARDENED, SELF-TAPPING
Interstate Machinery Co., Chicago, Ill.
Parker-Kalon Corp., New York City.

SHEETS—ALLOY
Inland Steel Company, Chicago, Ill.
International Nickel Co., New York, N. Y.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

SHEETS—BLACK, CORRUGATED, GALVANIZED
American Rolling Mill Co., Middletown, Ohio.
Brown Wales Co., Boston, Mass.
Inland Steel Company, Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

SHEETS—COLD ROLLED
Inland Steel Co., Chicago, Ill.

SHEETS—COPPER
American Brass Co., Waterbury, Conn.
Brown Wales Co., Boston, Mass.
Revere Copper & Brass, Inc., Rome, N. Y.

BUYERS' GUIDE

SHEETS—COPPER BEARING STEEL

American Rolling Mill Co., Middletown, O.
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

SHEETS—COPPER (LEAD COATED)

American Brass Co., Waterbury, Conn.
Revere Copper & Brass, Inc., Rome, N. Y.

SHEETS—GALVANIZED

Inland Steel Co., Chicago, Ill.

SHEETS—IRON

American Rolling Mill Co., Middletown, O.
Brown Wales Co., Boston, Mass.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

SHEETS—MONEL METAL

International Nickel Co., New York.

SHEETS—NICKEL

International Nickel Co., New York.

SHEETS—PURE IRON COPPER ALLOY

Inland Steel Co., Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.

SHEETS—REFINED OPEN HEARTH IRON

American Rolling Mill Co., Middletown, O.
Republic Steel Corp., Youngstown, Ohio.

SHEETS—SPECIAL FINISH

American Rolling Mill Co., Middletown, O.
Inland Steel Company, Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.

SHEETS, STAINLESS STEEL

Brown Wales Co., Boston, Mass.
Republic Steel Corp., Youngstown, Ohio.

SHINGLES AND TILE—METAL

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

SKYLIGHTS

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

SNOW GUARDS

Berger Bros. Co., Philadelphia, Pa.

SOLDER

Brown Wales Co., Boston, Mass.
Kester Solder Co., Chicago, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

SOLDER—ACID CORE

Kester Solder Co., Chicago, Ill.

SOLDER—ROSIN CORE

Kester Solder Co., Chicago, Ill.

SOLDER—SELF-FLUXING

Kester Solder Co., Chicago, Ill.

STOVE PIPE AND FITTINGS

Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

STRAINERS—ROOF

Barnes Metal Products Co., Chicago, Ill.

STRAPS—ORNAMENTAL PIPE

Barnes Metal Products Co., Chicago, Ill.

STRIP—COLD ROLLED

Inland Steel Co., Chicago, Ill.

STRIP—HOT ROLLED

Inland Steel Co., Chicago, Ill.

TINPLATE

Berger Bros. Co., Philadelphia, Pa.
Brown Wales Co., Boston, Mass.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Republic Steel Corp., Youngstown, Ohio.

TOOLS—TINSMITH'S

(See Machines & Tools—Tinsmith's)

UNIT AIR CONDITIONERS

Andes Range & Furnace Corp., Geneva, N. Y.
Forest City Foundries Co., Cleveland, O.
Fox Furnace Co., The, Elyria, Ohio.
Henry Furnace & Fdry. Co., Cleveland, O.
Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Ventilating Co., Chicago, Ill.
Lakeside Co., Hermansville, Mich.
Lennox Furnace Co., Marshalltown, Iowa.
May-Fiebeger Company, Newark, Ohio.
Meyer Furnace Co., Peoria, Ill.
Payne Furnace & Supply Co., Beverly Hills, Calif.

VACUUM CLEANERS—FURNACE

(See Cleaners—Furnace Vacuum)

VENTILATORS—CEILING

Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, O.
Independent Reg. & Mfg. Co., Cleveland, Ohio.

VENTILATORS—FLOOR

Aeolus Dickinson, Chicago, Ill.

VENTILATORS—ROOF

Aeolus Dickinson, Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Jordan & Co., Paul R., Indianapolis, Ind.
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo
Uno Ventilator Co., Cliftondale, Mass.

WELDERS, SPOT

Interstate Machinery Co., Chicago.

WOOD FACES—WARM AIR

Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Milwaukee, Canton, Chicago, LaCrosse, Kansas City.
Osborn Co., The J. M. & L. A., Detroit, Cleveland, Buffalo

CLASSIFIED ADVERTISING

4 cents for each word including heading and address. Count seven words for keyed address. Minimum $1.00 for each insertion. One inch $3.00. Cash must accompany order. Copy should reach us eight days in advance of publication date.

BUSINESS CHANCES

LIGHTNING RODS

Dealers who are selling Lightning Protection will make money by writing to us for our latest Factory to Dealer Prices. We employ no salesmen and save you all overhead charges. Our Pure Copper Cable and Fixtures are endorsed by the National Board of Fire Underwriters and hundreds of dealers. Write today for samples and prices. Address L. F. Diddie Company, Marshfield, Wis.

SITUATIONS OPEN

EXPERIENCED TRAVELING SALESMAN wanted. Must be experienced in forced air and gravity heating. Address Key 201, "American Artisan, 1900 Prairie Ave., Chicago, Illinois.

SITUATIONS WANTED

SITUATION WANTED BY FIRST CLASS sheet metal and furnace man, experienced in gas installations, coal installations, forced air and air conditioning plants. Can do all branches of sheet metal work. Can lay out own work and patterns. Married, sober, steady and reliable. As for wages, a steady job and a livable wage. Address Key 205, "American Artisan," 1900 Prairie Avenue, Chicago.

EXPERIENCED FURNACE SALESMAN would like position representing responsible manufacturer in Wisconsin. Address Key 202, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

ESTIMATOR POSSESSING SALES ABILity, 24 years of age, 8 years' experience in general sheet metal, ventilating, forced air conditioning heating, and roofing branches desires connection with firm offering future with junior partner possibilities. For interview address Key 195, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

WANTED TO HEAR FROM HIGH GRADE manufacturers of air conditioning and heating equipment who desire the services of a representative who is thoroughly trained in engineering, designing, and the practical installation of any type of warm air equipment. Can give the best of references as to promotion ability and sales experience. Address Key 203, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

SITUATION WANTED — PLUMBER sheet metal and furnace man wants position. Will go any place. A-1 references. Address L. C. Hughes, Forest City, Iowa.

FIRST CLASS SHEET METAL WORKER, experienced in trunk line system, ventilating, heating and general tin and sheet metal work. 18 years' experience. 36 years of age. Address H. E. Torrence, 4918 N. 27th, Omaha, Nebraska.

WANTED POSITION—BY FIRST CLASS sheet metal worker. Good at ventilation and dust and shaving collecting systems. Also other work. Can go out and close up jobs. Address Metal Worker, 1509 West Center Street, Milwaukee, Wis.

SITUATION WANTED—BY TINNER OF experience. Hardware clerk and do plumbing. Best of references, full particulars in future correspondence. Address M. B. Miles, Route 4, Box 182, Des Moines, Ia.

WANTED POSITION — AS FURNACE INstaller or engineer. Fifteen years' experience, no furnace problem too hard. Can also sell direct or to the trade. No reasonable offer will be refused. Address Key 199 "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

EXPERIENCED FURNACE SALESMAN would like position representing responsible manufacturer in Wisconsin. Address Key 202, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

LINES WANTED

FURNACE SALESMAN WOULD LIKE to represent a good furnace and stove manufacturer in Wisconsin. Address Key 192, "American Artisan," 1900 Prairie Avenue, Chicago.

WANTED TO BUY

WANTED TO LEASE OR BUY A SET OF patterns for a line of cast furnaces, 20", 22"; 24" and 26" fire-pot sizes. Address Key 204, "American Artisan," 1900 Prairie Avenue, Chicago.

FOR SALE

FOR SALE: TEN FOOT, 16-GA. CApacity, Chicago steel brake, in excellent condition. $135.00 F.O.B. Racine, Wisconsin. Address Key 206, "American Artisan," 1900 Prairie Avenue, Chicago.

FOR SALE IN CALIFORNIA — FIRST class sheet metal and heating shop, doing some plumbing. Up-to-date equipment. Part cash, balance by the month. Address Key 207, "American Artisan," 1900 Prairie Avenue, Chicago, Illinois.

FOR SALE—QUANTITY OF RADIATORS for steel furnaces. These will fit any standard furnace and can be bought cheap. For particulars address Key 197, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

A BARGAIN—ONE NO. 30 SLIGHTLY used Bryant warm air gas furnace complete with humidifier and 8 day thermostat. Address Jacob Brenner Co., Inc., 47 Third St., Fond du Lac, Wisconsin.

MISCELLANEOUS

WANTED BY FIRST-CLASS STEAMFITter and master plumber a shop to run on commission basis. Willing to invest $500.00 as a guarantee of good faith. Can also do all of the sheet metal and hot air furnace work that comes into the average shop. First class references as to ability, etc. Must be in Illinois and don't answer unless you have something good to offer. Address Key 200, "American Artisan," 1900 Prairie Ave., Chicago. Illinois.

WANTED—PARTY TO HELP FINANCE or to manufacture on royalty basis an oil burning furnace, different and more economical than any on the market. Address Key 198, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

Index to Advertisers

Firms represented in this issue are identified by the folio of the page on which their advertising appears. Advertising which appears in alternate issues is marked with an asterisk.

January, 1933

The man whose business

touches every budget in advertising

It is evening, and under the station lights, a man with a Gladstone bag moves out toward a limited train.

Tomorrow the records, the invoices, every document and report in a great publisher's circulation office will be opened to him. Each executive, each press foreman, every newspaper boy on the streets is instructed by the publisher to give this man every bit of information he can.

The man from the Audit Bureau of Circulations!

He is employed jointly by publishers and advertisers. Commissioned by them to go into every detail of circulation—*how great* it is, *where* it is, *how it is obtained.*

Over the continent, more than sixty of these trained auditors are on the road. In almost every publication office of importance in the United States and Canada they check, compare, analyze the facts.

Publishers want this work done so that they and their competitors will all be on the same basis. Advertisers need it so that their comparison of media may be all on the same basis—so that they may *know* what their dollars buy.

What is your share, as an advertiser, in directing these auditors of the A. B. C.? Are you supporting, helping to supervise these activities which help to guard your budget?

Advertisers are urged to join the distinguished group of advertisers, agencies and publishers who make up the Audit Bureau of Circulations, and who through co-operation have taken the guesswork out of circulation buying. Write today for full facts about Bureau membership.

An advertisement by the

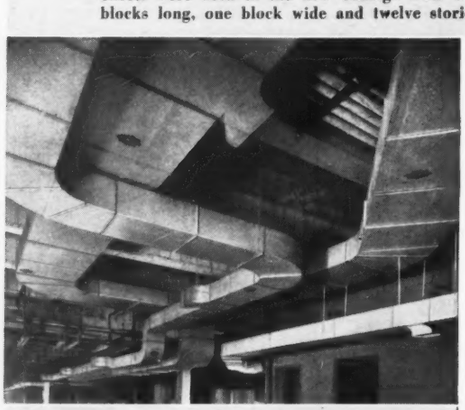
AUDIT BUREAU OF CIRCULATIONS

Executive Offices . . . Chicago

1500 TONS OF INLAND SHEETS

A few of the air-ducts for which 1500 tons of Inland Galvanized Steel Sheets were used in the new Chicago Post Office. The building is two blocks long, one block wide and twelve stories high in its main body.

IN THE *NEW* CHICAGO POST OFFICE



The Zack Company were the ventilating contractors; John Griffiths & Sons Company, the general contractors; and Graham, Anderson, Probst & White, the architects (all of Chicago).

THAT means that more than 2,000,000 square feet of surface had to be rolled correctly from high grade steel, and zinc coated properly—to assure the contractor of receiving material that would meet the exacting requirements. Inland Open Hearth Galvanized Sheets met this test 100%—not one sheet, in the thousands supplied on this job, failed!

You may be assured that Inland quality and Inland service—backed up by experienced men and the most modern equipment—will satisfy your needs, too! INLAND STEEL COMPANY, 38 South Dearborn Street, Chicago, Illinois.

INLAND STEEL

ABLE SERVANT OF THE CENTRAL WEST

Sheets Strip Plates Rails Track Accessories
Bands Structurals Piling Bars Rivets Billets